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Information Operations Team Training & Information Operations Training Aid

Information Warfare Effectiveness (IWE) Program

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14. ABSTRACT

The dual Information Operations Team Training (IOTT) and Information Operations Training Aid (IOTA) project was a joint 711th HPW/RHA and RHC effort designed to develop tools for Information Operations (IO) training support. The IOTT task established a set of IO practitioner-vetted Mission Essential Competencies, standardization and evaluation techniques for the Information Warfare Aggressor Squadron (IWAS) flights and recommendations for generating a MEC-based standardization and evaluation task. The IOTA task developed and evaluated the usability and usefulness of a prototype rich client Influence Operations Training Aid (IFOTA) for use in the 39th Information Operations Schoolhouse's introductory and advanced IO planning courses. IFOTA, which currently supports psychological operations (PSYOP), military deception (MD), operations security (OPSEC), public affairs (PA), and counterintelligence (CI), provides a structured planning environment for developing and deconflicting IO course of action (COA) recommendations and developing associated briefings.

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PREFACE

The Information Operations Team Training (IOTT) and IO Training Aid (IOTA) project was conducted under the Information Warfare Effectiveness (IWE) program, Contract No. FA8650-04-D-6405. Program management was provided jointly by Air Force Research Laboratory Human Effectiveness Directorate's Warfighter Readiness Research Division (711th HPW/RHA) and the Warfighter Interface Division (711th HPW/RHC). The current program manager is 1st Lt. Sarah Fockel (711th HPW/RHAS). The prime contractor is SRA International, Inc.; project management is provided by Mr. Steven Schafer.

The IOTT Mission Essential Competency task was performed by Aptima, Inc. The IOTA, which was renamed Influence Operations Training Aid (IFOTA), has been created for use at the 39th Information Operations Schoolhouse in their Introductory Information Operations Integrated Course (INTRO IOIC) and their Advanced Information Operations Integrated Course (ADV IOIC). IFOTA is designed and developed by SRA International, Inc.

ACKNOWLEDGMENTS

The IOTT/IOTA project wishes to acknowledge and thank the following individuals for their support to successful project completion. Dr. Joseph Weeks (711th HPW/RHAS) and Dr. Winston Bennett (711th HPW/RHAS) have provided ongoing guidance and assistance to the IOTT effort. The IOTT team gratefully acknowledges the members of the Information Warfare Aggressor Squadron, the Information Warfare Flights, the Network Operations Division (NOD), the Air Force Computer Emergency Response Team (AFCERT), and INOSC-East organizations who participated the MEC workshops. The IOTA team expresses appreciation for the interim guidance and support to the IFOTA development effort provided by Major Tim Gameros (711th HPW/RHC) and Major Janelle Viera (711th HPW/RHA) and Ms Alicia Bledsoe (711th HPW/RHA). Special thanks are also due to 39th IOS personnel Lt. Col. Thaddeus P. Settlemire, Commander, and SSgt James “Spike” Szeredy, who conceived the need for IFOTA and to their colleagues Sgt. Michelle DeAngelis, Sgt. Joe Mikos, and Sgt. Charles “Low” Simpson, as well as Mr. Russ McLaren (AFOSI) and Mr. Rolf Ludvigsen (SRA), who contributed valuable insights from their disciplinary perspectives.

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1.0 SUMMARY

The dual Information Operations Team Training (IOTT) and Information Operations Training Aid (IOTA) project was a 711th Human Performance Wing, Human Effectiveness Division (711th HPW/RHA)-led effort designed to develop tools for Information Operations (IO) training support. The IOTT task established a set of IO practitioner-vetted Mission Essential Competencies (MEC), standardization and evaluation techniques for the Information Warfare Aggressor Squadron (IWAS) flights and recommendations for generating a MEC-based standardization and evaluation task. The IOTA task developed and evaluated the usability and usefulness of a prototype rich client Influence Operations Training Aid (IFOTA) for use in the 39th Information Operations Schoolhouse's introductory and advanced IO planning courses. IFOTA, which currently supports psychological operations (PSYOP), military deception (MD), operations security (OPSEC), public affairs (PA), and counterintelligence (CI), provides a structured planning environment for developing and deconflicting IO course of action (COA) recommendations and developing associated briefings.

2.0 INTRODUCTION

The IOTT and IO Training Aid IOTA project, Delivery Order 08 under the Information Warfare Effectiveness (IWE) task, was conducted by the Air Force Research Laboratory (AFRL) 711th HPW/RHA during the period 25 March 2004 through 24 May 2010. IOTT/IOTA comprised two distinct tasks: the establishment of *Mission Essential Competencies (MEC) for Information Warfare Flights* and the development of the *Information Operations Training Aid (IOTA)*. The MEC effort was accomplished by Aptima, Inc. under the direction of prime contractor SRA, International, Inc.. The earliest phase of the IOTA effort was initiated by Metrica, Inc.; the effort was then transitioned to SRA International, Inc., which became solely responsible for its completion. The IOTT/IOTA project's purpose was to conduct and support research and development activities to improve the overall effectiveness of Information Warfare (IW) operations. This report discusses the accomplishment of the IOTT/IOTA project.

2.1 Task One: Mission Essential Competencies (MECs)

The IOTT MEC effort objectives were to apply the 711th HPW RHA MEC methodology to: 1) define competency-based training requirements, 2) identify competency "gaps" in operational training, and 3) identify training methods, tools, and performance measurement criteria for individual, flight, and squadron level combat mission readiness. Task One employed a functional work analysis of three AF IWAS flights to identify cognitive components of the MEC construct (including the MECs, supporting competencies, knowledge, skills, and developmental experiences) and to analyze and evaluate training gap impact. Data collections were accomplished in two workshops at each of the following: the IWAS, select Information Warfare Flights (IWFs) within the Air Operations Center (AOC), the Network Operations Division (NOD), the Air Force Computer Emergency Response Team (AFCERT), and Integrated Network Operations and Security Center (INOSC)-East organizations.

The initial workshop tentatively identified MECs; the second workshop obtained feedback and refined the initial collection. Specific focus was placed on identifying interconnections among knowledge requirements, knowledge development, and information/knowledge exchange for the

organizations studied and their higher headquarters, customers, and supporting organizations. Task One products included the following: 1) a recommended approach to bridge information exchange gaps among IO units, 2) a set of standardization and evaluation techniques for the IWAS flights, and 3) recommendations for generating a MEC-based standardization and evaluation task. The interim and summary reports on conduct and results of the IOTT MEC project were delivered to the government for publication separately from this report.

2.2 Task Two: Information Operations Training Aid (IOTA)

The objective of Task Two, the IOTA effort, was to integrate, demonstrate, and transition advanced training and rehearsal technologies to facilitate successful integrated combat operations for IO Warfighters. The effort was to provide science and leading edge technology to develop and demonstrate an innovative training aid for Influence Operations (IFO), called IFOTA. The effort included transition of an existing customer-mandated planning capability into a training aid to expedite, enhance, and enrich the training of inexperienced Influence Operations trainees in the successful planning and integration of IFO campaigns. The effort was envisioned in two parts. The first part encompassed the development of prototype software modules and supporting documentation, scenarios, and training materials. Proof of concept was demonstrated through testing in a simulated classroom exercise. The second part focused on an empirically based evaluation and assessment of the prototype software's *usability* and *usefulness*. Task Two products delivered to the government were the IFOTA software and software training, a user's manual, and a formal evaluation of the usability and usefulness of the IFOTA software. During the course of the effort, the IFOTA software task was updated to incorporate a new module, a change in platform and the addition of several functions. In consequence, the IFOTA software deliveries were incremental; the final iteration was IFOTA version 4.0, an Eclipse-based rich client platform (RCP) with both student and instructor modes and five IFO planning modules: PSYOP, MD, OPSEC, PA and CI. IFOTA 4.0 incorporated both tree and Gantt-style timeline views of the integrated, effects-based IO plan, which associated tasks with objectives and measures of merit and a filterable, map-aided scenario selection interface.

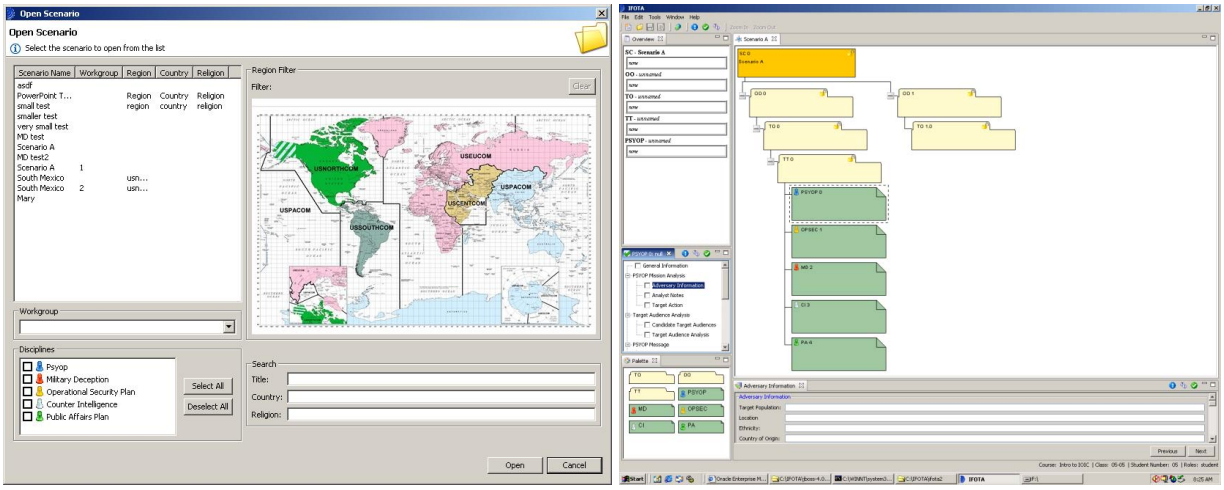

Figure 1. IFOTA opening interface and example plan tree view

The primary stakeholder for the IOTA effort was the 39th Information Operations Squadron (39th IOS) at Hurlburt Air Force Base in Florida. The 39th IOS is U.S. Air Force's premier Information Operations and Cyber Formal Training Unit. Four courses are taught there: 1) the Information Operations Integration Course (IOIC), 2) the Signature Management Course (military deception and operations security for wing level SMC officers), 3) a military deception course for operational level planners, and 4) the Undergraduate Network Warfare Training course. IO and Cyber schoolhouse classrooms are equipped with cutting edge communication and computer systems, including secure video teleconferencing and fiber optic infrastructures; software applications include the Information Warfare Planning Capability (IWPC). The schoolhouse is designed to support real-time war gaming and instruction at multiple security levels.

The IFOTA tool was initially designed to meet IFO training support needs expressed by the instructors for the IOIC, required training for Airmen assigned to IO flight billets; IFOTA was intended to promote guided discovery within scenario based training, to accustom students to work within the conceptual framework of the IO portion of the Joint Air Operations Plan (JAOP). It was also to serve as a test environment for the course capstone exercise, a role-playing effort in which students work within a scenario to plan and submit the IO portion of the JAOP. Promoting in depth preplanning analysis, IFOTA was envisioned as an adjunct to rather than a replacement for the current IO planning program of record, IWPC. [Note: Although the IOTA project was initially conceived to eventually encompass the full range of Information Operations, the project was descoped to focus on IFO training.]

2.3 IOTT/IOTA Accomplishments

The IOTT/IOTA project produced both Information Operations training guidance and a prototype tool for instructional and refresher use at the 39th IOS and at the IWFs. The project built upon prior work by Aptima, Inc., in MEC definition, and leading edge software design approaches being developed by SRA International, Inc. It also drew from guidance created by the IWF and planning communities (e.g., handbooks, exercise materials, training briefings), and to some extent, from published work done by Metrica, Inc., for AFRL that had begun to break down IO tasks. The products have been successfully shared with the operational community. The IOTA product, the IFOTA tool, was demonstrated at the 2007 JFCOM Information Operations Planning Capability-Joint (IOPC-J) Warfighter Analysis Workshop, the 2008 Air Combat Command Warfighter Analysis of Innovative Technologies and Concepts (WAIT-C) interactive technology demonstration and at the 2006 and 2007 Phoenix Challenges, where it received enthusiastic response from IO professionals. In addition, the structured planning and analysis framework IFOTA offers drew praise from a range of AOC planners, who found its methodology readily generalizable to strategic and operational planning.

The body of this report describes the data collection (knowledge elicitation) and design plan, encompassing the work domain analysis (including training gap analysis), work-centered design approach (including usability and utility testing), and proof of concept for the IOTA project. The IOTT MEC report, as noted earlier, was delivered to the government separately and may be requested through the government project manager.

3.0 APPROACH

Knowledge elicitation for the IOTA task was accomplished at the 39th IOS at Hurlburt Air Force Base, FL. A joint Cognitive Systems Engineering and Systems Engineering (CSE/SE) team of design specialists made two trips to collect information on site. Feedback on collected information and requirements analysis was accomplished via teleconference.

3.1 Cognitive Work Analysis

During the course of the IOTA effort, cognitive task analysis laid the foundation for the IFOTA design work. The design team employed cognitive task analysis (CTA) to elicit, document, and evaluate information about the work domain and the users' work-centered requirements. CTA is an integrated set of methods and tools for uncovering both the cognitive processes that control task performance and cognitive capabilities employed in task performance. Over the course of the IFOTA task effort, the design team evolved its CTA philosophy and methodology to refine its processes and incorporate lessons learned in how to successfully translate CSE products into design requirements that can be readily understood and used by the SE development team. A foundational concept for CTA development is that insertion of an aiding tool effectively changes the work environment, and therefore, business processes, opening opportunities for business process redesign (BPR). The IFOTA team integrated several Unified Modeling Language (UML) modeling techniques to enhance the usefulness of their elicitation opportunities and improve communication between cognitive systems and software engineers. There are four elements of the IFOTA CTA process that bear mention:

- Modeling of human-to-human, human-to-system, and system-to-system workflows to capture the current work environment and support redesign analyses.
- Frequent user validation and course correction, incorporated into an iterative design process, is emphasized. Users get a chance to see how their inputs are interpreted in prototype designs and to ensure both that what was heard was what was said and that new ideas sparked by the design evolution are captured for the next iteration.
- Requirements traceability is maintained, specifying sources including underlying doctrine and command direction as well as situational constraints and restraints and insights from individual experience.
- Context is maintained through the organized presentation of requirements in terms of the situationally defined work functions they support.

To serve the customer, the aiding system end user, the design team conducts unstructured interviews, employing elements of several CTA methods for elicitation. After extensive domain research, a joint CSE/SE team approaches the user in the user's workspace; the team conducts cognitive walk-throughs of both typical and atypical work days to capture the range of work activities in context of variable workload conditions. The team examines critical incidents for cause and effect relationships (Flanagan, 1954) that extend its understanding of the work environment. The team also conducts field observations and collects example work artifacts (Eggleston, 2003). The team then transforms raw notes into concept maps (Moon, 2004); for an example, see Figure 2. Other initial artifacts include product-focused procedural task diagrams (Militello & Hutton, 1998) and communications diagrams (Moon, 2004) to capture work structure. The IFOTA CSE/SE analysis lays out operational and system requirements,

maintaining traceability, and employs use cases and other SE documentation methods to ensure system function meets operational needs (Zhou & Burns, 2004).

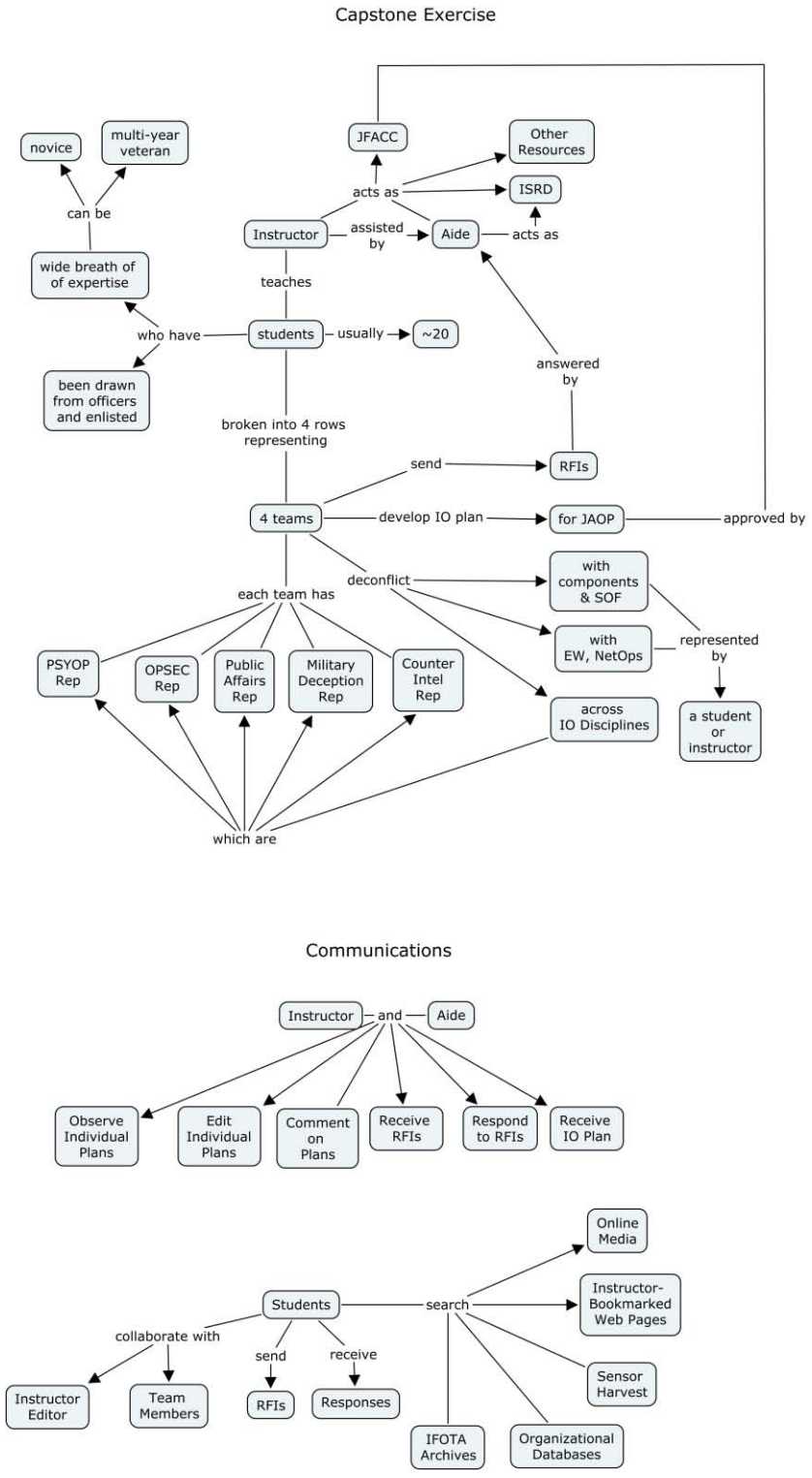

Figure 2. Concept map of Capstone Exercise from IOIC instructor interview.

3.1.1 Applied Cognitive Task Analysis (ACTA)

The CTA method employed is a modified form of the Applied Cognitive Task Analysis (ACTA) method developed by Klein Associates. The ACTA method (Militello & Hutton, 1998) employs verbal protocols to elicit work domain knowledge. According to Militello and Hutton, ACTA provides streamlined CTA methods developed for training practitioners and systems designers to elicit and represent cognitive components of skilled task performance, and the means to transform those data into design recommendations (p. 1619). Developed under a Navy project, the complementary elements of the ACTA elicitation method include:

- Task Diagram Interviews (scoping the task, building a roadmap of goal-oriented process)
- Knowledge Audits (determining what operators must know to successfully complete tasks, capturing work patterns through structured interviews)
- Simulation Interviews (capturing decision points, judgments, and work-arounds through generative interviews, expanding and refining the decision criteria for task accomplishment)

The IFOTA design team used task diagramming interviews, abbreviated knowledge audits and focused simulation interviews to draw requirements from the operational community. The information obtained was represented in concept maps and task diagrams (Figures 2 and 3), in which the capstone exercise and Counterintelligence planning process were mapped. In concert with the above techniques, the design team documented field observations in order to capture the realities of work activities in the work environment.

Analysis of the information collected during the knowledge elicitation phase is supported by multiple methods. Process flow charts, Integrated Definition for Function Modeling (IDEF0), event sequence analysis, and sequence diagrams are familiar methods to display the march of events, decision points, and feedback loops of the tasks under investigation. The linear appearance of the process flow and IDEF0 methods have been criticized in the past for obscuring the complexity of the event sequence (Figure 3). Concept mapping, although traditionally used to graphically convey information in the form of statements, is sufficiently flexible to permit the investigator to lay out information to suit the needs of the analysis.

3.1.2 Work-Centered Design (WCD).

The guiding principles for the IFOTA CTA were found in AFRL's work-centered support system method, which was developed to support work-centered design, a methodology that emphasizes work as a dynamic process comprising problem solving/decision making, collaboration, product development, and work management, each of which must be explicitly addressed in the design process (Eggleston, 2003).

The IFOTA task developed a contextually based perspective on the work-centered design concept and our focused application of several CTA knowledge acquisition capture and analysis strategies was modified to directly support software design.

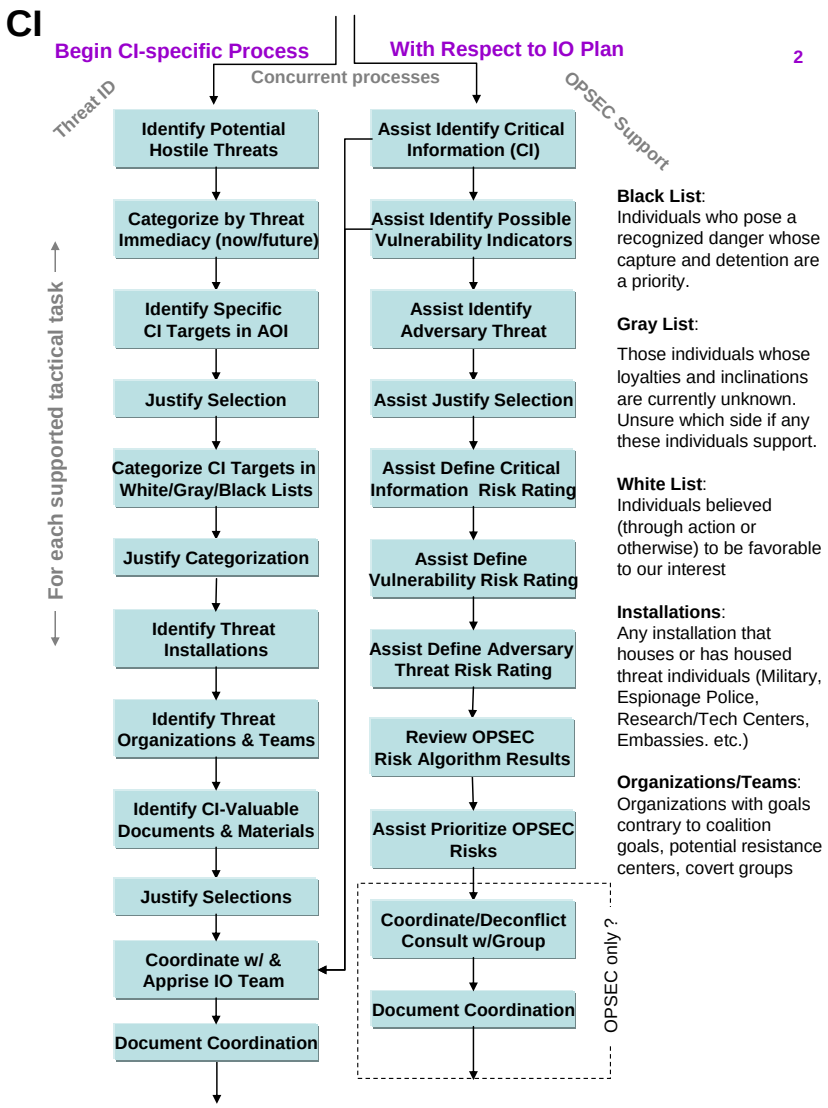

Figure 3. Counterintelligence process flow (based on interviews with CI subject matter experts)

3.1.3 CTA Artifacts, WCD and Software Requirements Specification

The context of work-centered aiding system design is business process reengineering (BPR)—the insertion of an aiding system changes the business process. Therefore, the CSE/SE team approaches each collection effort as an opportunity to document and analyze the current and projected business process. This perspective suggests a number of commonly accepted systems engineering methods to document analysis in a format that is readily understood and used by CSE/SE staff.

The software design information that is captured through CTA is initially embedded in CSE artifacts. However, once environmental constraints, task sequences, information exchanges, decision requirements, task goals and products are identified, the information can be represented in standard SE decompositions, such as flow charts (e.g., cross-functional flow charts, process and information flows) and UML diagrams (e.g., sequence diagrams, use cases). This serves two important functions: 1) it permits the CSE staff to control the translation of design guidance into

design specification and 2) it provides uninterrupted traceability from data collection to design requirements and design execution. Figure 4 illustrates CSE/SE translation.

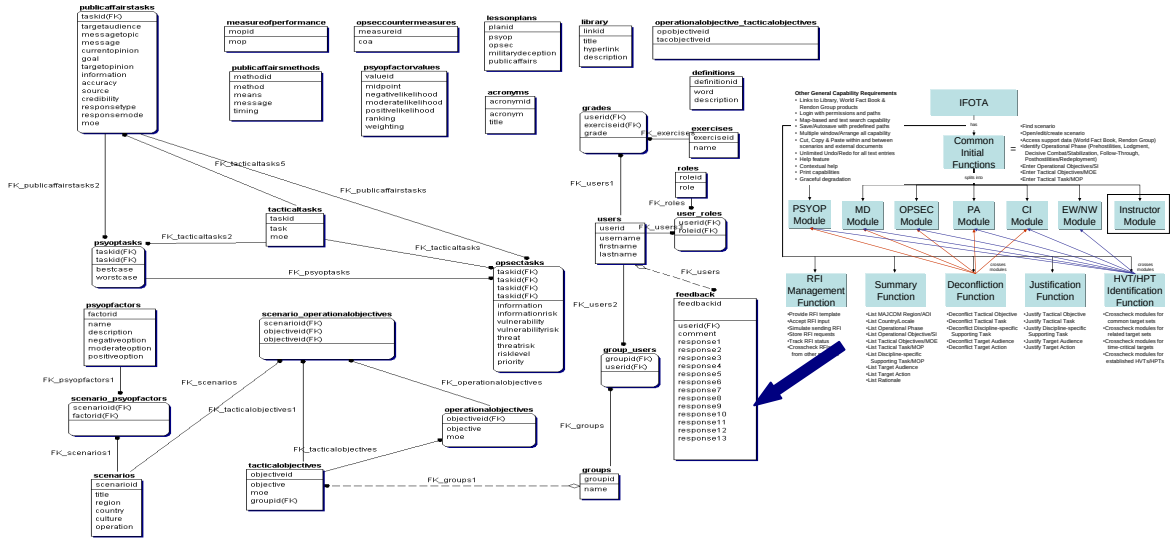

Figure 4. IFOTA CSE to SE information transfer.

3.2 IFOTA Knowledge Elicitation

The IFOTA knowledge elicitation was conducted over the course of two trips to the 39th IOS and was supplemented by e-mail and teleconference. The first trip laid the groundwork for the training support effort. Instructors explained course objectives and measures of merit and provided student handbooks, supplementary literature (e.g., AF doctrine documents), sample course curricula, and course briefings. The 39th IOS instructors conducted tours of the facility and described typical class activities. Instructors noted the range of student expertise and the need to challenge class members according to capability. The second trip demonstrated a web-based version of the IFOTA concept provided by subcontractor Metrica, Inc. The demonstration and evaluation of the browser-based tool held on-site with the 39th IOS sparked further requirements specifications that led to the transition of IFOTA from a web-enabled form-based version to a fat client application with more design flexibility and more capability.

4.0 RESULTS AND DISCUSSION

4.1 Knowledge Elicitation Trip 1

The initial knowledge elicitation trip was hosted by the IOIC instructors at their 39th IOS facility on Hurlburt AFB. Interviews were arranged with PSYOP, MD, PA, and OPSEC representatives. As the tool to be developed was to be jointly evaluated on utility and usefulness, the data collection was organized around these two themes.

At the time of the knowledge elicitation, the IOIC was transitioning from a ten-week to a six-week initial qualification training course designed to train IO planners assigned to IWFs. The course focused on the fundamental knowledge required to leverage IO within air operations planning. It taught the basics of IO, Air Force and Joint doctrine, executing organizations and

operational functions through lectures, seminars, participatory planning activities and a capstone exercise in which student teams planned an integrated IO campaign. At the time data collection was initiated, the curriculum also included introduction to the Joint Air Operations Center (JAOC) and Joint Air Operations Planning, air warfare employment and concepts, fundamentals of IO disciplines, and IO integration into deployed air power structure and processes.

While students represented a breadth of rank and career fields, the majority were either currently assigned or will receive assignment to slots within the AOCs. Classes of approximately 20 students were split into four teams and practiced interpreting planning guidance, assessing situations and developing and deconflicting IO planning recommendations in support of the Joint Force Air Component Commander (JFACC). Emphasis was placed not only on *leveraging IO targeting options* but also on *plan integration* (integrating IO methods to achieve an objective or objectives) and on *plan deconfliction* (resolving potential conflicts among component planning efforts). Several points were raised that were overarching design influences. The first two issues regarded fostering good planning skills: 1) promoting identification of task terminators and effectiveness metrics, and 2) promoting probabilistic thinking (i.e., forecasting probability of success) and exploratory excursions in support of forecasting. The third issue involved ensuring ability to teach to individual capabilities, challenging a range of student expertise.

The desired system, as described by instructors, would allow students to conduct structured, collaborative, integrated IO planning—from the identification of operational and tactical objectives and tactical tasks (with associated success indicators and measures of merit) through the development of proposed task actions and support requirements. Instructors expressed a teaching for mastery objective. Their ideal system would permit instructor-supervised students to build a complete proposed plan and would also capture student rationales, supporting documentation, instructor comments, and deconfliction actions. It would support forecasting activities such as "What if," sensitivity, and impact analyses. Initial requests considered a feedback function that would identify missteps as they were made and display a comparison of "right path" vs. "wrong path" cascading effects. The system would support in-class instruction, practice exercises, and testing.

The baseline system concept and tasking was derived from a PSYOP planning tool (PSYOP PT) developed by Metrica—a browser-based tool with several PSYOP scenarios (e.g., refugee repatriation, insurgency support, population protest, force surrender) and a subjective rating method for calculating anticipated change resistance. The IO methods shared a common focus on identification of target audience (TA) and employment of behavioral shaping methods. Methodologies, however, were discipline-specific and required considerable adjustment of and extension to the Metrica PSYOP trainer capabilities. The PSYOP method assessed current vs. desired TA attitudes to find a behavioral shaping difficulty index; command guidance provided themes and messages. OPSEC employed its own risk assessment methodology. OPSEC was noted as having highest potential for inter-discipline conflict, as the other disciplines typically exploited friendly activity indicators, whereas OPSEC was focused on obscuring those indicators. MD methods, focused on redirection of adversary attention and perception control, were highly integrative and frequently required coordination with and active cooperation of sister services as well as other IO disciplines. Student efforts were to be guided, step-by-step, through each discipline's process. Specific discipline references provided means as well as methodology.

Students were to cite both applicable doctrine and the intelligence information used to support their strategies. Developing student attention to the relationship between objectives/tasks and measures of merit (e.g., measures of effectiveness and measures of performance), as well as the identification of termination criteria, were to be emphasized.

The ongoing documentation of the complete student planning effort would allow the instructor to correct errors and respond to student queries on the fly, understand underlying student thought processes, and check references for appropriateness. Excellent plans would be archived for future use in instructional scenarios. Instructors and permitted students would create and archive whole and partial IO example plans for use in classroom instruction. Desired planning visualizations included a map-based view for archived plan selection and a holistic hierarchical plan view. Instructors would manage student log-ins and permissions, plan archives and student records. Reachback simulation was considered very important. The system, as initially envisioned, would require a browser capability, connections to Secret Internet Routing Protocol Network (SIPRNET) and Joint Worldwide Intelligence Communications System (JWICS) as well as to-be-determined databases (e.g., Sensor Harvest), local area network access (server-based archives), a recorded instant messaging, and possibly, chat capability, shared document access and editing management. Figures 5 and 6 illustrate the intended system use, as understood from the initial data collection. Forecasting and feedback functions, while discussed in the idealized system description, were not incorporated at this time.

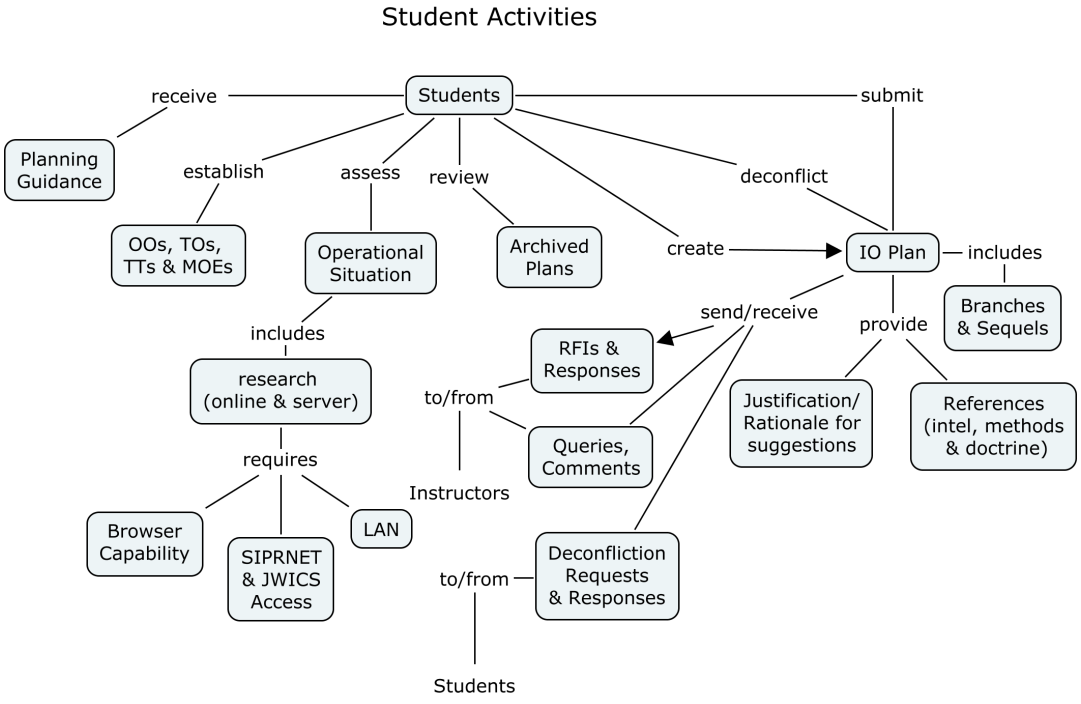

Figure 5. Planned Student Activities within IFOTA as initially described.

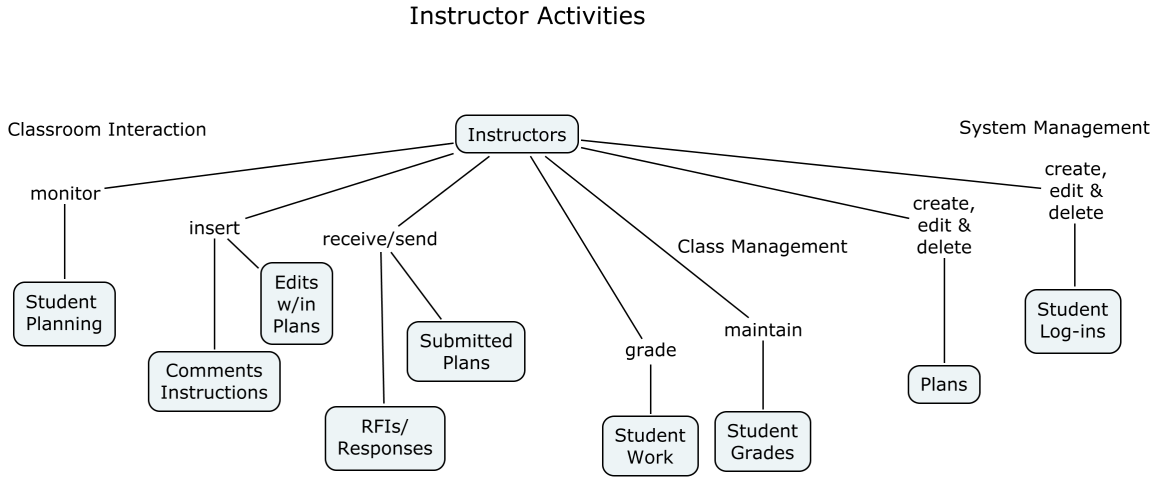

Figure 6. Planned Instructor Activities within IFOTA as initially described.

As shown above, the knowledge elicitation drew forth an idealized system description that was identified as a goal to work toward in a spiral design model. Initial funding for the system covered the basic design of a student module supporting four disciplines (PSYOP, MD, OPSEC, and PA), a searchable plan archive and the instructor module for managing student log-ins. The next iteration incorporated a CI component, undo/redo functions, a clickable map view for plan selection, and extended the instructor module to capture student grades. The next iteration provided a spell check function and Gantt chart plan timeline display. Neither the feedback function nor the exploratory excursion or probability of success algorithms were funded.

The following section presents an example of the discussion points that the elicitation raised. A list of derived system requirements follows.

4.1.1 Elicitation Findings/Discussion Points for Usefulness (Focus on the Task)

Job Requirements

1. Mission-level Expectations:
   a. Students will be taking the role of AOC staff and will have to consider how their input factors into the overall mission plan

   Issue: None currently identified

   b. Students will take roles of PSYOP, PA, OPSEC, and MD planners. Their plans should show synergistic effect of integrated IO plan.

   Issue: Links (especially dependencies) among plan elements must be manifest. Timing considerations must be clear; temporal impossibilities should raise flags.

   c. Expectations are that students will push to have the training tool made operational.

   Issue: The more realistic the training tool is, the more likely students are to push for it; a very realistic training tool will be easier to operationalize. However, the train as you fight concept may become an issue, unless this tool is adopted into a system of record.

   d. The students must integrate and deconflict their recommendations with other IO disciplines

   Issue: A vision of how the deconfliction aspect will work has not yet been articulated.

Trainer Tool Use

1. Tracking:
   a. Trainers have not yet considered all they want the tool to track. They exhibited a positive response to the suggestion that the tool might include a mechanism for tracking exercise and test performance. System tracking would lighten the trainer workload.

   Issue: Any tracking expectations should be worked out now to aid the designers' planning process. Trainers indicate they will be giving individual grades and group grades for group efforts. How to track that should be thought out in advance as well.

2. Testing:
   a. Trainers expect to use the tool in both in class exercises (partial tasks) and the capstone exercise that will permit students to integrate all they have learned in the course.

   Issue: Trainers indicated a desire to be able to see what students were doing in order to supervise and aid.

   b. Trainers want to integrate students' capabilities in team exercises and stretch everyone. They want to elicit thinking through student identification of options and variables. Trainers suggest that the tool include an option that allows them to increase exercise difficulty based on student performance ("teach to each" versus "teach to mean"). An example is the ability to go from a two-channel "on/off" scenario to a five-channel one, increasing the number of options in the variables offered. They also suggest adding an assessment method to tell what would have happened if the student had chosen differently, following the branches, and a method to anticipate sequels.

   Issue: Currently there is no scalability in the training module. Specific requirements for extension modules are yet to be determined.

3. Feedback:
   a. Subjective weightings/rankings are only as good as the student's expertise and information base. The exercise of decomposing the factors that affect the TA and watching how changing weights for individual factors changes the probability of success is valuable in itself. Trainers suggested that they would like to see feedback. They envisioned the following training scenario:
      - For a given exercise, the system provides a series of variables that form three distinct paths to follow (Path A=50% of the solution, Path B=100%, and Path C=25%).
      - System collects data on the students' selection of variables and how they justified them.
      - System identifies the incorrect paths and the shows cascading effects from following the wrong route.
      - System shows the correct path and its cascade of effects.
      - Trainer tracks student progress; if at any point, the student chooses A, the trainer can show why that path is not optimal, but if the student chooses C, the trainer knows to take him/her back to basics.

Issue: Hardwiring, as described above, cuts down on options, but the trainers say that is all right for a training aid. Providing only this option would not necessarily provide a close match with reality, where there is often no right answer.

b. However, the system could also be designed to allow freedom of thought/movement, offering a best choice answer and several others that varied in degree of usefulness, and allowing the student to work out a best possible solution. In this mode, the system again would show possible outcomes.

Issue: Including both of these modes would allow the student to progress from canned classroom scenarios to real world scenarios. It would also provide a method for providing increased difficulty for more able students.

Student Tool Use

1. Student Task:
   a. The classes mirror every step of the planning process, taking the student from "hands-on" trainer-supported exercises to a "hands-off" capstone training effort. Trainers provide the students with a set of Joint Task Force (JTF) objectives and plug in standardized objectives for the exercise, depending on the scenario (e.g., eight objectives for phase one). Influence operations objectives will be the sub-objectives (influence nation command, influence political structure, etc.) Each individual discipline can answer the need. Students learn to write their own objectives and how to modify Air Staff concepts to perception management needs and integrate counter-intelligence perspectives. Students must learn to support *why* a non-kinetic option is preferable to convince the AOC. They must be able to present their plan, provide appropriate details, make a strong argument, show the effects and the effects desirability, and defend the plan's solution.

   Issue: IOTA must be updated to include the entire planning process; the designers intend for the tool to mirror the language used in AOC planning. As the AOC planning process is under development, language changes may have to be updated/updatable. (measures of merit, should be included in the program, but need to be adjustable as analysis renders them inappropriate.)

   b. In the new exercises, all targets go "on deck" no matter how they are to be prosecuted, only the restricted target list will be retained. Kinetic and non-kinetic options will be de-conflicted (e.g., will ensure that there is no close air support activity scheduled for the vicinity of leaflet drops). The point is to integrate the air picture for the day and deconflict all missions at once.

   Issue: How the deconfliction aspect will be managed is not yet articulated.

   c. Students will practice assuming different roles in the AOC. Hands-on exercises will require both individual effort, with each student using different expertise to do his/her own portion, and group coordination, integrating and deconflicting individual efforts. Lesson includes teaching students how to present to staff estimates of non-kinetic actions. In order to accomplish the task, students also must learn how to manage group dynamics.

   Issue: How the students will collaborate is not yet articulated.

2. Task Support:

a. Classification: At IOIC, students will stay on JWICS, with SIPRNET and Non-Secure Internet Protocol Router Network (NIPRNET) for research and reach-back capabilities. MD will be done at the SECRET/NOFORN level, and will incorporate national level entities on JWICS. Exercises may require going to a high level classification.

Issue: Unclassified paradigms for scenarios will need to be built; there will be nothing classified in the developmental design. For the MD section, the design will need to separate high and low classification aspects (multi-level security?).

b. MD, OPSEC and PSYOP employ somewhat different terminologies to reflect their different perspectives. OPSEC is the only track that asks the student to look at how their plan will both impact US activities (giving Indications and Warnings; I&W) and US perceptions.

Issue: Language usage will have to be carefully documented and managed. Additionally, the OPSEC track may pose difficulties for students as they have to focus their objectives differently than in PSYOP and MD. The OPSEC objective is to remove I&W, whereas the MD objective is to exploit them.

c. How well the students know where to get data will vary by student; students are given lists of urls in class that the instructors have compiled.

Issue: The instructor-supplied urls can be integrated into the internet browser as favorites and the file emailed for importation in the students' home systems.

d. Students must factor in cultural analysis issues (e.g., how to communicate with non-literate populations). Students are taught to leverage preconceived adversarial and military mindsets.

Issue: PYSOP recommendations are turned over to the Army for implementation. The actual method of implementation is not determined by the student.

e. In the current version of the tool, the focus is on the factors that influence Target Audience behavior, the estimated difficulty friendly forces will experience directing TA behavior toward the goal state.

Issue: The goal state is represented by standard PSYOP objectives; the actual PSYOP plan is not captured when users project probability of success influencing TA behavior.

f. PSYOP doctrine is in a state of flux. The new JP 2.5.3 draft hasn't been signed yet; neither has the new OPSEC draft.

Issue: The changes in doctrine will probably impact lesson plans and decision support tool requirements. Additionally, according to the trainers, current AF training focuses on deliberate and contingency planning for force execution missions. Training doesn't cover how to plan for Humanitarian Assistance (HA), Noncombatant Evacuation Operations (NEO), and Civil Affairs (CA) outside of hotspots in the Middle East. Training doesn't cover planning for nation building or planning for handing over an area to the ambassador for reconstruction. Training doesn't cover how to redeploy, reconstitute or employ forces in interim periods and how to get people in and out safely. PSYOP is concerned with developing ways to endear US forces to the population to reduce risk and increase cooperation. Any future effort to add in these training modules will extend required scenarios considerably.

4.1.2 Elicitation Findings/Discussion Points for Usability (Focus on the User)

User Characteristics

1. Class Demographics:
   a. Joint class members are integrated by service and rank (range from E-2, E3 to Lt Col). Members exhibit differential levels of expertise; levels of expertise range from 2 to 3 years (beginner) to 15 years (expert).

   Issue: Class tools need to be scalable to teach and test multiple levels of expertise.

   b. There are one to two instructors per ~20-person Influence Operations (IO) class. The class focuses on Falconer AOCs. Class population comes from the nine Information Warfare Flights (IWFs). Class constitution is governed by the gaining unit and their needs. Percentages change from class to class.

   Issue: Student need for instructor attention will vary. Class tools need to be self-supporting to some degree to allow students to work independently.

   c. Students are taught how to support all IO disciplines used in AOC but when they report to their IWFs, they will fill whatever slots are open, performing intelligence preparation of the battlespace (IPB) for deliberate planning and continuous update functions. During contingencies, approximately ½ the flight will go with the AOC; the rest will remain with the IWF, supplying reachback.

   Issue: There is a concern that students may forget lessons that aren't reinforced over time.

2. Student Computer Expertise:
   a. The tool is Hyper Text Markup Language (HTML)-based and will be accessed as a web page. The web page interface is desirable as all students should have familiarity with a web environment; students are expected to know how to use typical internet browser functions.

   Issue: The tool needs to incorporate all the capabilities of a web environment (*highlight, copy, paste, save as*). Aids should include pop ups, hover, find, and drill down capabilities. Users should be able to jump to mail to output to other organizations.

   b. Student briefings, which simulate presentations to AOC decision makers, are done in PowerPoint (however, trainers express a desire for the system to integrate with all MS Office).

   Issue: The tool currently supports *copy* and *paste* functions, but automating transfer of information from the tool to the PowerPoint presentation would save time and effort. Trainers want the program to integrate with Microsoft Office and be able to "push" to Theater Battle Management Core Systems (TBMCS).

Task Characteristics

1. Task Overview:
   a. Tasks are constrained by class time. In the first part of the course, trainers give an overview of the different disciplines, the standard measures of behavior, and how to measure behavior. In the second phase, subject matter experts (SMEs) give units of instruction on their specific disciplines, use slides accompanied by slide notes. The course moves from rote memory exercises to demonstrations of subject matter expertise.

   Issue: Currently, students get three weeks of practice in the planning stage. Eventually, trainers will integrate practice exercises into more of the course. Instructors and

students will create new scenarios to add to IOTA's existing scenario database. As more information is acquired, there will be a need to update the influence operations factors to reflect increased understanding.

b. Using the tool prototype, for a given scenario, students should be able to identify operational and tactical objectives and associated measures of effectiveness (MOEs), characterize the target audience and identify opportunities, limiting factors (LIMFACs) and susceptibilities, and rank and weight the susceptibilities. The students should be able to give a level of confidence in information and a level of effectiveness (ability to reach the susceptibility); the student should be able to weight the likelihood of success.

Issue: Students will have access to SIPRNET, NIPRNET, and JWICS. The user must be able to integrate database access and exercise activities. The students use IWPC, InfoWorkspace (IWS), and Information Operations Navigator (ION); some degree of IOTA integration may be required.

c. To complete the task, students should be able to use available databases to research culture and leadership aspects to determine how to affect the population and the leadership.

Issue: Navigation between planning and decision support tools and supporting databases should require minimal effort and minimal time. No picture of what the screen will look like while the student moves between application and reachback capabilities is currently articulated. How the system looks, how the students will keep track of where they are between applications, how quickly and easily they can navigate and how quickly and easily the database supports their information quests are all human factors integration issues.

GUI Environment

1. Common Look and Feel:
   a. The IOTA tool, like some other applications students will use, is web-based. Other applications are MS Office-based or employ the standard Windows work environment.

   Issue: The IOTA tool graphical user interface (GUI) should leverage student familiarity with the MS Internet Explorer web browser and Office suite GUIs. It should also leverage all Windows "Help" capabilities and user aids (Help topics, Table of Contents, Index, Glossary, context-sensitive Help, etc.)

Operational Environment

1. Environmental Characteristics:
   a. Students will be working as teams to create their recommendations. Students will represent the different disciplines/roles found in the AOC.

   Issue: Students need to be able to work alone or collaboratively. Students need to be able to deconflict their respective plans.

4.1.3 Requirements

1. Usefulness Criteria (How effective and flexible is IOTA in supporting the work of the IO instructor and student?):

a. Effectiveness
   i. Ensure IOTA supports IO planning for all phases of an OPLAN
   ii. Ensure Objectives are entered in correct terminology and structure and can have associated success indicators and measures of merit inserted
   iii. Account for uniqueness of each track (e.g. MD process and target distinctions from PSYOP process/targets, OPSEC process/targets)
   iv. Take advantage of synergies among tracks
   v. Account for risk as well as probability of success in presentation of output
   vi. Ensure each module (PA, MD, PSYOP, OPSEC) reflects the process for that track (not all processes are the same)
   vii. Ensure IOTA ontology/taxonomy mirrors the language of the course materials and the relevant discipline
   viii. Ensure IOTA reinforces the instructors presentation of the course work
      - IOTA presentation mirrors IO planning process taught in lessons
      - IOTA provides cues/prompts when reachback is required
      - Import methodology and format for reachback simulates process taught in lessons
   ix. Ensure IOTA reinforces student understanding of the course work
      - IOTA presentation is familiar to student and mirrors process taught in lessons
      - Understanding of when reachback is needed is clear and straightforward
      - Easy cues/prompts to access needed data sources (reachback)
      - Student can import reachback data as required
      - Interoperability with other applications – student can provide model output in required presentation formats
   x. Ensure IOTA provides adequate scalability
      - IOTA can be used for beginning and challenged students and advanced students can take advantage of features to push the analysis envelope and bring in more expertise and sophistication
      - Ability to control versions, configuration of tool and data
   xi. Ensure IOTA supports student/student and student/instructor collaboration
      - Input and results be exchanged, shared
      - Framework to support collaboration
      - Internal (within schoolhouse) and external (reachback) collaboration
      - Ensure ability to integrate IO track (MD, PA, PSYOP, OPSEC) plans (build supporting objectives and target assessments)
      - Ensure ability to de-conflict IO track plans (flag objectives and analyses that will negatively impact plans for other IO tracks)
      - Output directly supports presentation of an integrated, de-conflicted IO plan for a given scenario, mission objective

xii. Ensure IOTA provides adequate extensibility
- Students can use this tool when they report to their assigned units
- IOTA can be implemented in IWPC or Sensor Harvest as a tool to support deliberate and crisis action IO operational planning
- Compatibility/extensibility to ION (joint community)

xiii. Ensure IOTA provides tracking, both of student rationales and grades
- A way to capture student thought process for each input to the model (error traceability, rationale, justification, support for end recommendations and outbrief) – notes pages
- Three-level (red, yellow, green) student grading at completion of model runs with appropriate feedback and indications of where errors were made, improvements could be made
- Guided discovery

b. Flexibility
   i. Easy to update and expand to advanced versions, new modules, refined modules
   ii. Ability to access pre-canned objectives, modify pre-set objectives, add new objectives

2. Usability Criteria (How easy is this tool to use?)

a. Communication/Integration
   i. Ensure IOTA supports implementation on JWICS
   ii. Ensure IOTA can access SIPRNET and NIPRNET source data

b. Situation awareness/Sensemaking
   i. Ensure IOTA provides event and change detection
   ii. Ensure IOTA provides visualization support
   - Graphical display of "what if" and impact analysis
   - Progress bar to indicate what steps have been successfully accomplished
   - Buttons to move among track modules (PA, PSYOP, MD, OPSEC)
   - Glossary

   iii. Ensure IOTA maps output to what's needed for target planning presentation (e.g. targeting sheet)

c. Error detection and recovery (student)
   i. Ensure IOTA provides Help functions – useful, comprehensive, clear and easy to use
   ii. Ensure IOTA provides indicators of invalid input (e.g. weights) – "need to re-evaluate"
   iii. Ensure IOTA provides indicators of output that does not make sense

d. Predictive capabilities
   i. Provide "What-if" analysis
   ii. Provide Sensitivity analysis
   iii. Provide Impact analysis

e. Interoperability
   i. Ensure IOTA search engine integration (reachback)
   ii. Ensure IOTA provides pointers, aids to access existing data sources

- Databases (various organizations)
- Web sites (instructor bookmarks)
- Documents
- Media
- SMEs

iii. Ensure IOTA has a "Send to" function for checking, collaboration

4.2 Knowledge Elicitation Trip 2

The second knowledge elicitation trip provided new opportunities to flesh out customer requirements through examination of a proposed system design. The design was originally intended to undergo user testing in a live classroom demonstration. However, the agreed upon date for the demonstration occurred during a session break; in consequence, user testing was done by instructors. A formal evaluation of the proposed system design, specifically directed under the statement of work, was also conducted and submitted to the government. The customer demonstration, coupled with the evaluation, illustrated the limitations of the employment of a browser-based forms approach taken from the PYSOP PT. The user testing opportunity drew forth more fully defined customer requirements, prompting the proposal of an RCP solution; requirements definition was immediately initiated to support the design shift. It was during this requirements collection that, in order to emphasize the Influence Operations nature of the tool that its title became IFOTA. A partial representation of system requirements is presented in Table 1. More complete requirements documentation is found in Appendix A.

Table 1. A Partial Representation of IFOTA Requirements.

	General
1.	The IFOTA shall be able to be installed and run on a JWICS system
2.	The IFOTA shall have a Windows look and feel
3.	The IFOTA shall have a main menu with submenus and toolbar with icon buttons
4.	The IFOTA shall conform to Defense Information Infrastructure Common Operating Environment (DII COE) and Xerox usability standards
5.	The IFOTA shall open to a blank window
6.	The IFOTA shall provide a file chooser to display existing files for selection
7.	The IFOTA shall provide scenario search capability
8.	The IFOTA shall provide a login function
9.	The IFOTA shall allow the user to open existing files
10.	The IFOTA shall allow the user to create new files
11.	The IFOTA shall allow the user to save files
12.	The IFOTA shall allow the user to modify files according to permissions
13.	The IFOTA shall ensure students can't overwrite scenarios from library
14.	The IFOTA shall allow students to modify (add/delete/change) their own work
15.	The IFOTA shall allow the user to print whole files
16.	The IFOTA shall allow the user to suppress printing Subject Matter Analysis & Research Toolkit (SMART) input screens
17.	The IFOTA shall allow the user to suppress printing SMART results
18.	The IFOTA shall allow the user to print the scenario summary
19.	The IFOTA shall allow the user to print single/multiple page(s)
20.	The IFOTA shall allow cut, copy, and paste between fields, screens, windows and programs
21.	The IFOTA shall allow unlimited undo/redo and repeat for all text entries

22.	The IFOTA shall provide a Help function
23.	The IFOTA shall provide contextual help
24.	The IFOTA shall provide a glossary encompassing the terms from the Joint Air Estimate Process (JAEP), IO joint publications (JPs), IO Air Force Doctrine Documents (AFDDs), and IO Air Force Tactics, Techniques & Procedures (AFTTPs)
25.	The IFOTA shall display software version and Program Manager/Developer contact information under Help:About IFOTA
26.	The IFOTA shall display descriptive titles on all windows and dialog boxes
27.	The IFOTA shall permit the user to open, manage, and work in multiple windows (up to six?)
28.	The IFOTA shall permit the user to open multiple scenario files
29.	The IFOTA shall allow the user to open multiple modules in multiple windows
30.	The IFOTA shall allow the user to open multiple instances of the same module
31.	The IFOTA shall allow the user to open old scenarios concurrent with new scenario
32.	The IFOTA shall allow the user to navigate through screens in a maximum of 5 steps
33.	The IFOTA shall have PSYOP, MD, OPSEC, and PA modules
34.	The IFOTA shall be extensible to include a future CI module
35.	The IFOTA shall have a module that accepts/displays electronic warfare (EW) and net warfare (NW) planning entries
36.	The IFOTA shall have an Instructor module
37.	The IFOTA shall use terminology that meets 39th IOS approval
38.	The IFOTA shall use procedures that meet 39th IOS approval
39.	The IFOTA shall identify and keep track of where each planner is within the 5 operational phases
40.	The IFOTA shall identify and keep track of where each planner is within the 72--hour planning cycle
41.	The IFOTA shall display plans across operational phases and planning cycles
42.	The IFOTA shall accept and maintain integrity of task branches
43.	The IFOTA shall have a status screen that summarizes current status for each module
44.	The IFOTA shall have a deconfliction/coordination function
45.	The IFOTA shall recognize workgroup members
46.	The IFOTA shall allow workgroup members to view each others' work
47.	The IFOTA shall allow chat-style communication between workgroup members
48.	The IFOTA shall capture chat communication between workgroup members
49.	The IFOTA shall provide a Request for Information (RFI) management function
50.	The IFOTA shall allow students to enter their own decision selections
51.	The IFOTA shall provide graceful shutdown
52.	The IFOTA shall be designed to be extensible
53.	The IFOTA shall be designed to facilitate integration with IOPC-J
	Login Function
54.	The IFOTA shall prompt the student to login (appropriate permissions will be keyed to login)
55.	The IFOTA shall identify types of users and work group members through coded logins
56.	The IFOTA shall prompt the student to select a module in the login screen
57.	The IFOTA shall use login information to direct file save paths
	Search Function
58.	The IFOTA shall provide scenario search capability on a single screen through a clickable world map and a text-based search function
59.	The IFOTA shall provide a geographically-based scenario search capability through a Major Command (MAJCOM) map that permits the user to drill down to specific countries and local areas to obtain the scenario files for the chosen area.
60.	The IFOTA shall provide a text search capability that permits the user to obtain the scenario files for specific ethnocultural groups, tactical tasks, discipline-specific tasks, or geographic locales
61.	The IFOTA shall prompt the scenario creator/modifier to tag the scenario by geographic locale, ethnocultural group, and tactical/support tasks

62.	The IFOTA shall permit the scenario file to be opened from the scenario search results display
	Menu/Tool Bar
63.	The IFOTA shall provide access to all functions through a menu bar with main menus and submenus
64.	The IFOTA shall display keystroke combination shortcuts for actions on the submenus
65.	The IFOTA shall identify icon function with hovertext
66.	The IFOTA shall provide alternate access to frequently used functions through a tool bar
67.	The IFOTA shall include icons to customize the tool bar to include any function
	Help Functions
68.	The IFOTA shall provide a "WinHelp" or "HTML Help" Help function
69.	The IFOTA shall allow Help to remain onscreen while the user is working in the file
70.	The IFOTA Help screens shall be dockable/undockable
71.	The IFOTA Help screens shall be resizable
72.	The IFOTA shall allow the user to print Help entries
73.	The IFOTA Help system shall include definitions of terms, directions for procedures, and links to support material provided by 39th IOS
74.	The IFOTA shall provide contextual help at all decision points
75.	The IFOTA shall provide contextual help in the form of "on-demand" popups
76.	The IFOTA shall access dialog box contextual help using a question mark icon
77.	The IFOTA shall provide contextual help in the form of text definitions for course vocabulary items
78.	The IFOTA shall highlight text entries that have associated contextual help
79.	The IFOTA shall access highlighted contextual help items by doubleclicking on highlighted text
	Instructor Module
80.	The IFOTA shall allow instructors to view students' work in real time
81.	The IFOTA shall associate workgroup and student identifications with each saved file
82.	The IFOTA shall capture justifications and references for student's work
83.	The IFOTA shall allow instructors to modify (add/delete/change) student decision point selections and save modifications to a new file
84.	The IFOTA shall notify the student the instructor has modified the student's work
85.	The IFOTA shall allow the student to transfer to the modified file
86.	The IFOTA shall capture grades for student work
87.	The IFOTA shall capture student actions in a readable log file
88.	The IFOTA shall permit instructors to create scenario templates
89.	The IFOTA shall permit instructors to modify scenario templates
90.	The IFOTA shall allow instructors to modify scenario data
91.	The IFOTA shall allow instructors/staff to create new scenarios
92.	The IFOTA shall provide a method for testing students
93.	The IFOTA shall provide a method for grading and annotating tests
94.	The IFOTA shall provide a method for calculating grades
95.	The IFOTA shall capture summary/final grades
	Initiation
96.	The IFOTA shall open each new work session with the JWICS regional commands map
97.	The IFOTA shall display regional command member countries in matrix form
98.	The IFOTA shall link to basic political and sociocultural information for each country
99.	The IFOTA shall allow the user to select a single country
100.	The IFOTA shall display a map for each country
101.	The IFOTA shall link to demographic, political and sociocultural information for each distinct region within the country
102.	The IFOTA shall open each scenario with the summary sheet
103.	The IFOTA shall provide a list of combined operational tasks organized by service and operational phase

104.	The IFOTA shall provide success indicators for each operational task
105.	The IFOTA shall allow the user to select operational task(s) and success indicators
106.	The IFOTA shall provide an example list of Air Force tactical objectives organized by service it supports
107.	The IFOTA shall provide example measures of effectiveness (MOEs) for each tactical objective
108.	The IFOTA shall allow the user to select/write up to 5 tactical objectives
109.	The IFOTA shall allow the user to select/write MOEs for each objective
110.	The IFOTA shall provide an example list of Air Force tactical tasks organized by service it supports
111.	The IFOTA shall provide example measures of performance (MOPs) for each tactical task
112.	The IFOTA shall allow the user to select/write up to 5 tactical tasks
113.	The IFOTA shall allow the user to select/write MOPs for each task
114.	The IFOTA shall allow the user to enter own tactical tasks
115.	The IFOTA shall allow the user to enter own MOPs
116.	The IFOTA shall show task branches
117.	The IFOTA shall allow the user to create task branches
118.	The IFOTA scenario shall identify the current planning stage
119.	The IFOTA scenario shall identify the current operational phase
	Status/Summary Screen Function
120.	The IFOTA shall have a status screen that summarizes current status for each module
121.	The IFOTA shall display current information from each module on the summary screen(s)
122.	The IFOTA shall display information from each module from the following fields on the summary screen(s): operational objective, SI, tactical objective, MOE, tactical task, MOP, tactical support task, MOP, target audience, target action, rationale, link to synchronization matrix
123.	The IFOTA shall pull summary information from the corresponding data entry fields in each individual module
124.	The IFOTA shall the status screen will update automatically whenever any data that feed the status fields change
125.	The IFOTA shall have a deconfliction version of the summary screen with checkboxes to indicate deconfliction has been accomplished
	Deconfliction/Coordination Function
126.	The IFOTA shall have a deconfliction/coordination feature that prompts the user to deconflict/coordinate with other disciplines
127.	The IFOTA shall display the deconfliction screen whenever the student reaches an identified deconfliction point in the process
128.	The IFOTA shall have a deconfliction button that brings up the summary/deconfliction screen at user command
129.	The IFOTA shall use the status screen for the deconfliction/coordination function
130.	The IFOTA shall display checkboxes by each deconfliction action in the deconfliction function
131.	The IFOTA shall timestamp each deconfliction/coordination action
132.	The IFOTA shall open a popup text field to capture the student's deconfliction action whenever the student fills in a deconfliction checkbox
133.	The IFOTA shall open a popup text field to capture the student's deconfliction rationale whenever the student fills in a deconfliction checkbox
134.	The IFOTA shall not allow the student to proceed until the student has checked each box and entered text in each action description text field
	Multiple Window Capability
135.	The IFOTA shall permit the user to manage multiple windows
136.	The IFOTA shall allow the user to tile windows horizontally and vertically
137.	The IFOTA shall allow the user to resize all windows
138.	The IFOTA shall allow the user to move all windows
139.	The IFOTA shall allow the user to close all windows

140.	The IFOTA shall allow the user to minimize all windows
141.	The IFOTA shall allow the user to move freely between windows
142.	The IFOTA shall include a toggle capability to enlarge window in which student is working
143.	The IFOTA shall allow the user to tab between windows
	RFI Management Function
144.	The IFOTA shall provide a Coliseum RFI template
145.	The IFOTA shall provide the means to make other RFI templates
146.	The IFOTA shall allow the user to draft RFIs to obtain information necessary to complete scenario tasks
147.	The IFOTA shall capture RFIs for instructor
148.	The IFOTA shall simulate tracking RFI status
149.	The IFOTA shall allow the user to create assessment collection RFIs
	PSYOP Module
150.	The IFOTA shall provide example PSYOP-specific tactical support tasks
151.	The IFOTA shall allow the user to select up to ? tactical support task(s) for each tactical task
152.	The IFOTA shall allow the user to enter own tactical support tasks
153.	The IFOTA shall provide space to insert MOPs for each tactical support task
154.	The IFOTA shall give an example measure of performance
155.	The IFOTA shall capture RFIs needed to perform assessment (in Coliseum format)
156.	The IFOTA shall pop up deconfliction screen after tactical support task(s) are selected
157.	The IFOTA shall capture/display themes and symbols for each branch
158.	The IFOTA shall allow the user to enter own message and theme for each branch
159.	The IFOTA shall pop up a deconfliction screen after messages and themes are selected
160.	The IFOTA shall capture justification for theme/symbol selection
161.	The IFOTA shall list (or link to) target audiences and specific political/sociocultural and demographic information
162.	The IFOTA shall allow the user to select a target audience
163.	The IFOTA shall allow the user to enter a target audience
164.	The IFOTA shall capture justification for target audience selection
165.	The IFOTA shall generate RFIs needed to fill knowledge gap (in Coliseum format)
166.	The IFOTA shall pop up deconfliction screen after target audience is selected
167.	The IFOTA shall provide a dropdown list of example target actions
168.	The IFOTA shall allow the user to enter own target action
169.	The IFOTA shall allow the user to select/enter target action
170.	The IFOTA shall provide example MOPs/MOEs
171.	The IFOTA shall allow the user to enter MOPs/MOEs
172.	The IFOTA shall capture collection requests for target action assessment
173.	The IFOTA shall capture justification for how target action supports messages/themes/symbols
174.	The IFOTA shall pop up deconfliction screen after target action is selected
175.	The IFOTA shall list target audience/target action specific situational/cultural factors
176.	The IFOTA shall provide default selection of applicable situational/cultural factors (from embedded knowledge)
177.	The IFOTA shall allow the user to modify applicable situational/cultural factors
178.	The IFOTA shall allow the user to enter own situational/cultural factors
179.	The IFOTA shall list possible situational/cultural conditions (from embedded knowledge)
180.	The IFOTA shall allow the user to select applicable conditions
181.	The IFOTA shall allow the user to enter new conditions
182.	The IFOTA shall capture user's prioritization (ranking) of conditions (vulnerabilities)
183.	The IFOTA shall capture user's relative weighting of conditions (susceptibilities)
184.	The IFOTA shall capture user's Red/Yellow/Green (stoplight metaphor) assessment
185.	The IFOTA shall allow the user to skip SMART model and go directly to delivery method selection

186.	The IFOTA shall collect SMART model decision criteria
187.	The IFOTA shall use scales to capture user assessments required for SMART model
188.	The IFOTA shall generate RFIs needed to fill SMART criteria knowledge gap (in Coliseum format)
189.	The IFOTA shall display SMART model evaluations
190.	The IFOTA shall allow the user to modify SMART model inputs and rerun algorithm
191.	The IFOTA shall provide an example list of delivery methods
192.	The IFOTA shall allow the user to select/write a delivery method
193.	The IFOTA shall pop up deconfliction screen after delivery method is selected
194.	The IFOTA shall provide a PSYOP summary relating PSYOP tasks and MOPs to tactical tasks/MOPs and tactical objectives/MOEs
195.	The IFOTA shall capture collection requests for course of action assessment
196.	The IFOTA shall permit the student to deconflict across planning cycle and operational phases

Not all of the requirements collected for the system were approved for or intended to be met in the initial system. The SMART model and associated algorithms were dropped. Many of the proposed Help, Deconfliction, and Instructor functions were deferred to later iterations or dropped.

4.2.1 Processes

The following flow diagrams illustrate the understanding of desired system function obtained during elicitation. The original elicitation did not cover CI, although it was requested for a later iteration and elicitations were conducted at that time to create a CI process flow. It is included here for completeness.

Figure 7 describes the login process and opening a scenario. Student planning efforts were tied to planning scenarios that included situation descriptions and simulated command guidance. Supplementary materials, such as country reports, the CIA World Fact Book, and bookmarked web pages of interest were available to simulate planning support documents. Scenarios were catalogued by type of scenario, region of interest, and sociocultural similarity (at this time, represented by religious affiliation). Students could look for completed scenarios to study them and borrow concepts or open an assigned scenario to begin planning efforts. Students were to begin by examining command guidance identifying operational and success indicators as well as command directed themes and messages. Figure 8 shows discipline-specific activity sequences.

4.2.2 Task Descriptions

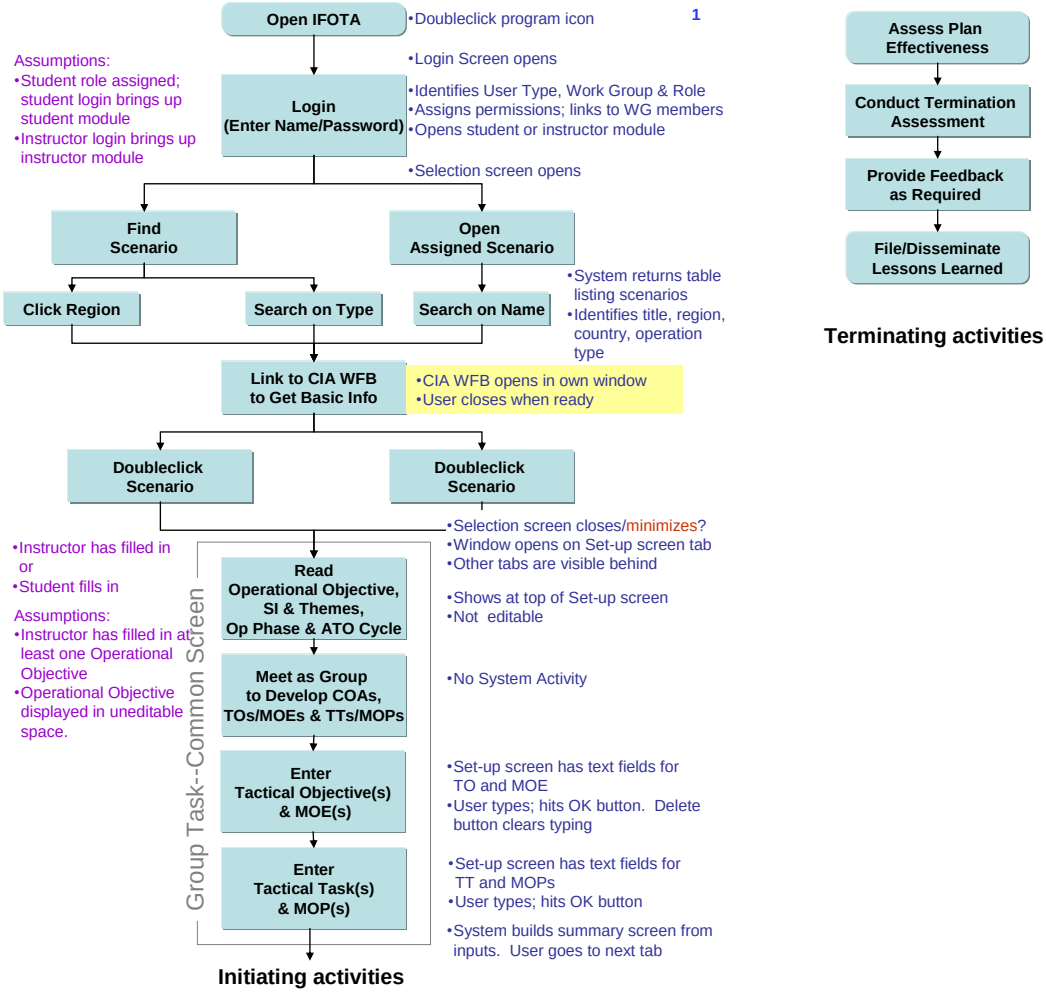

Figure 7. Initiating and terminating an IFOTA planning effort.

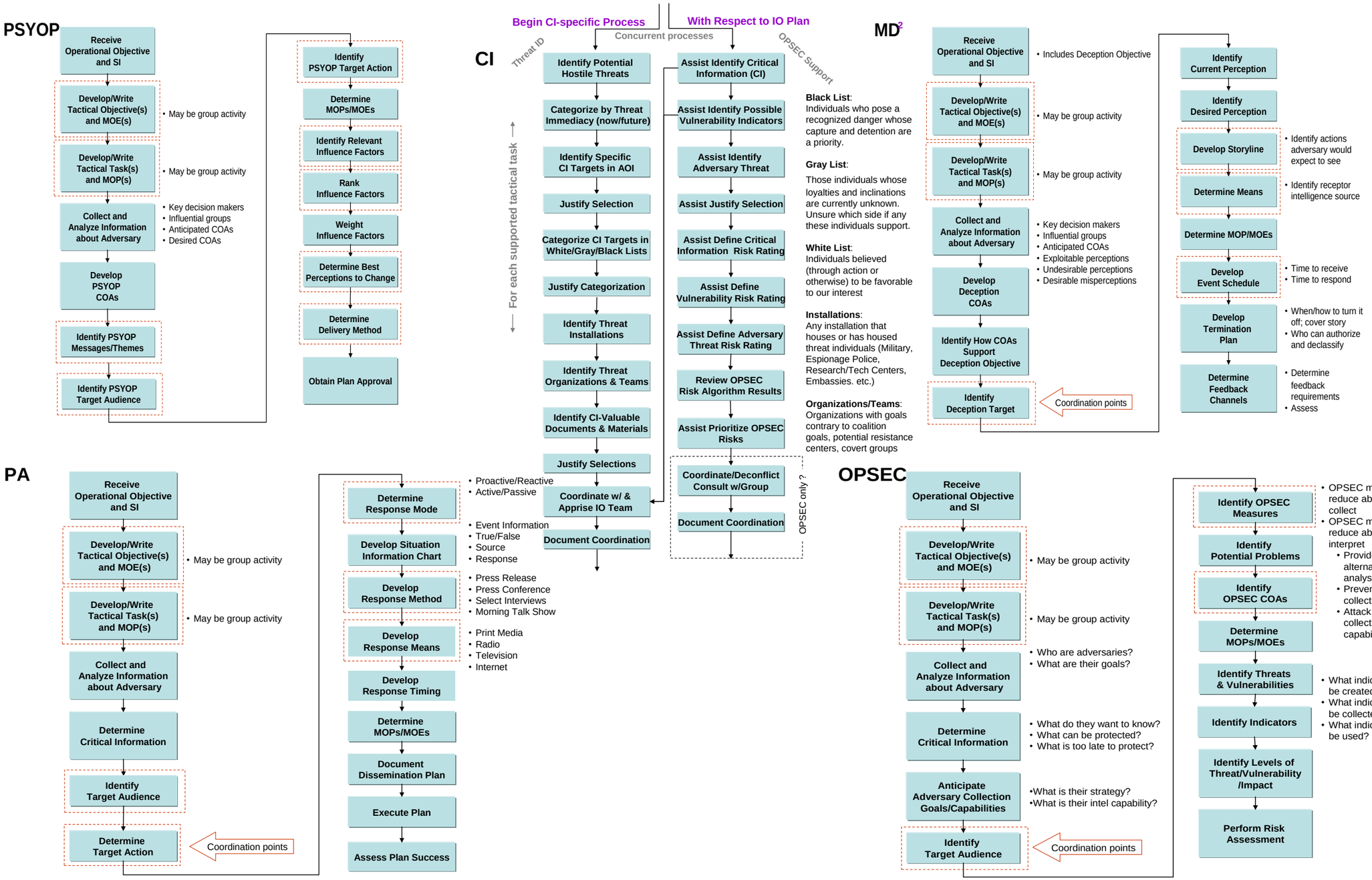

Figure 8. IO Processes

5.0 IFOTA DEVELOPMENT

IFOTA 1.0 guided the student through the PSYOP, OPSEC, PA, and MD student planning capabilities, capturing student rationales and deconfliction efforts. IFOTA 1.0 promoted collaborative work among IO disciplines and allowed instructors to monitor and communicate with students.

The tasking set forth in the Statement of Work directed the transition of the IFOTA browser-based prototype from an existing, customer-mandated, planning capability into a training aid to expedite, enhance, and enrich the training of inexperienced Influence Operations trainees in the successful planning and integration of Influence Operations campaigns. Two major tasks were envisioned. The first area focused on developing scenarios, modules, and exercises resulting in a software package, training on the software, and a software user's manual for IFOTA. The second major task area focused on an integrated effort to ensure that the IFOTA product, training, and documentation would be both *usable* and *useful*. It directed the empirically based evaluation and assessment of *usability* and *usefulness* through scenario-based testing by subject matter experts. Specific development goals included the following:

- Transition the existing PSYOP PT into an IFOTA encompassing training in planning for PSYOP, MD, OPSEC and PA and incorporating software modifications (e.g. sliding bars and color displays) from review and critique of the existing PSYOP PT.

- Design, develop, and implement a new module to encompass the planning component of MD, including OPSEC and allowing deconfliction of MD, PSYOP and PA mission objectives. Identify a taxonomy of potential objectives/missions, design an interface, and integrate delivery methods and target audience vulnerabilities.

- Design, develop, and implement a new module to encompass the planning component of PA and allowing deconfliction of PA mission, PSYOP, MD, and OPSEC mission objectives. Identify a taxonomy of potential objectives/missions, design an interface, and integrate delivery methods and target audience vulnerabilities.

- Design, develop, and implement a new module to encompass the functional aspect of identifying and selecting optimum delivery methods. Identify a taxonomy of delivery methods, design the software interface, and integrate the delivery method (or methods) that best exploit the vulnerabilities of the target audience.

Additional tasks included development of two IFO scenarios involving one culture, identifying objectives, target audience, and providing a list of cultural/situational factors/vulnerabilities. The conduct of a live classroom exercise demonstration, and a usability/usefulness focused design evaluation and recommendations. The live classroom exercise was reconfigured as an interactive demonstration using instructors and selected

SMEs, due to classroom scheduling difficulties. The two scenarios were delivered to the government separately, as was the requested software evaluation. Figure 9 shows a screenshot from IFOTA 1.0.

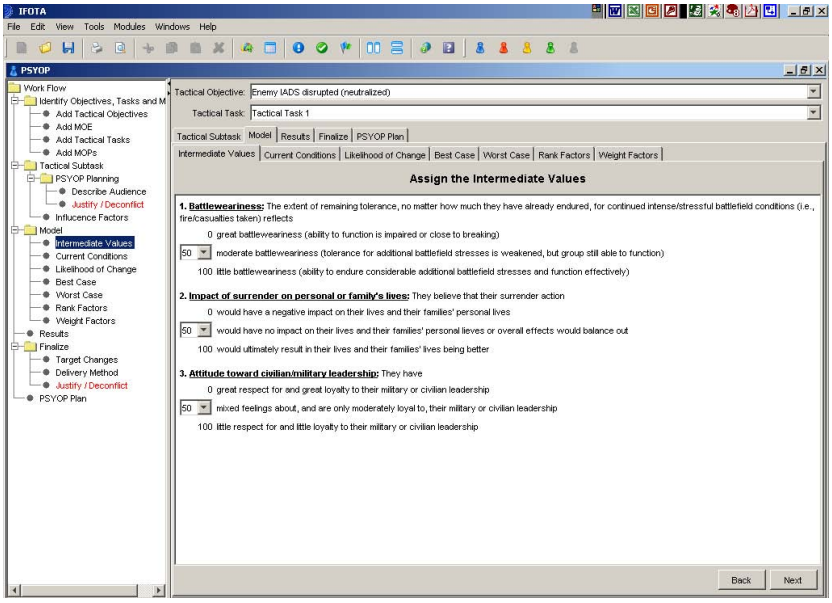

Figure 9. IFOTA 1.0 multi-tabbed PSYOP scenario showing evaluation of TA resistance

IFOTA 2.0 reorganized the screen real estate to provide multiple dockable/undockable panes surrounding a main work area, added a CI module and a more fully functional Help system. Figure 10 shows a screenshot from IFOTA 2.0.

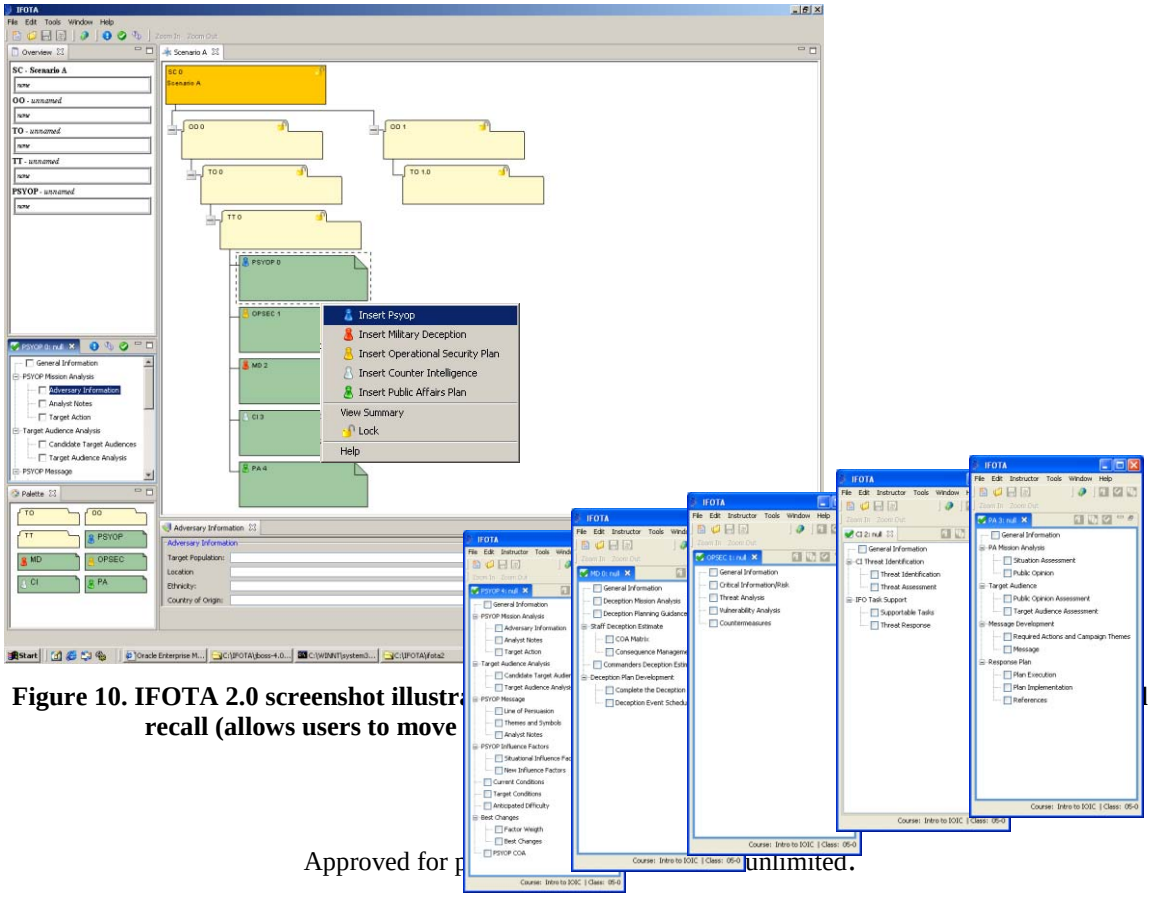

Figure 10. IFOTA 2.0 screenshot illustr
recall (allows users to move

IFOTA 3.0 added the following functionalities:

- Enhanced Architecture
  - Oracle database
  - J2EE for component-based multi-tier enterprise
  - Eclipse runtime environment provides common interface for extensions to core IO planning capabilities (enhanced plug-ins)
- Spell Check capability
- Gantt Chart (Time-Series Views) for temporal view of plans
  - Visual cue for deconfliction
- Combo Boxes
  - Decision aid support
  - Include Operational Taxonomy

Figure 11 shows the synchronization matrix (Time-Series View) from IFOTA 3.0.

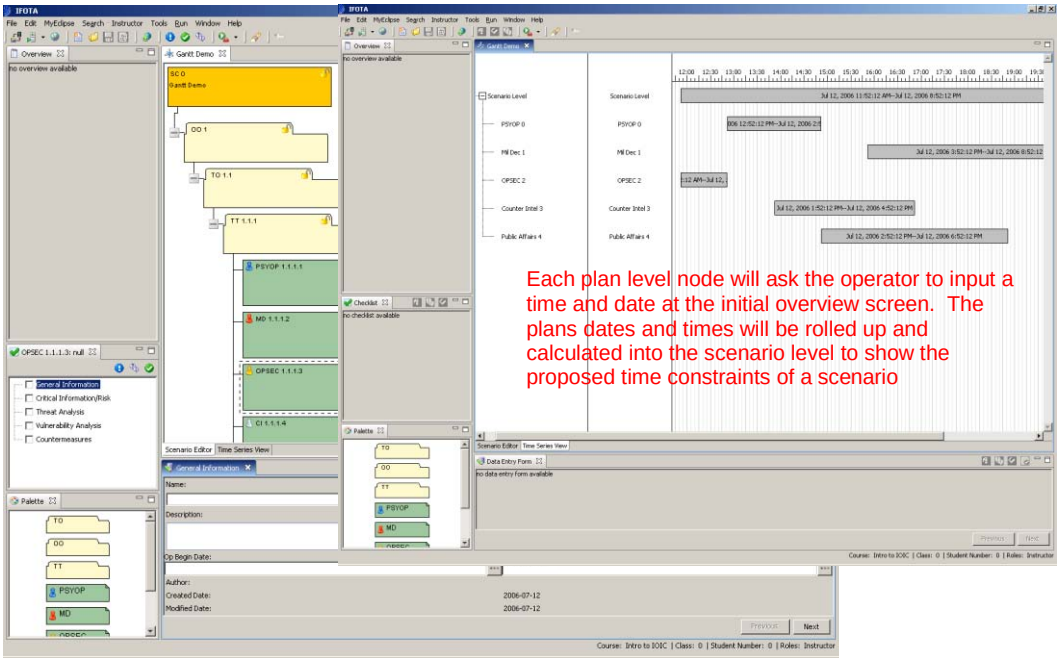

Figure 11. IFOTA 3.0 User interface showing addition of Time Series View tab and function

IFOTA 4.0 added the following functionalities:

- Deconfliction Tool
  - Decision-Aid for deconfliction of IFO plans
- COA Rating
  - PSYOP-specific, cost/benefit-based, post-wargaming COA selection decision matrix
- PSYOP Estimate Template
  - PSYOP Estimate of the Situation template that guides and documents PSYOP estimate development activities
- Database/Back-end Upgrade
- Additional Scenarios and Data in Database

- Worksheets and User Guide updates

Figure 12 shows the deconfliction function in IFOTA 4.0.

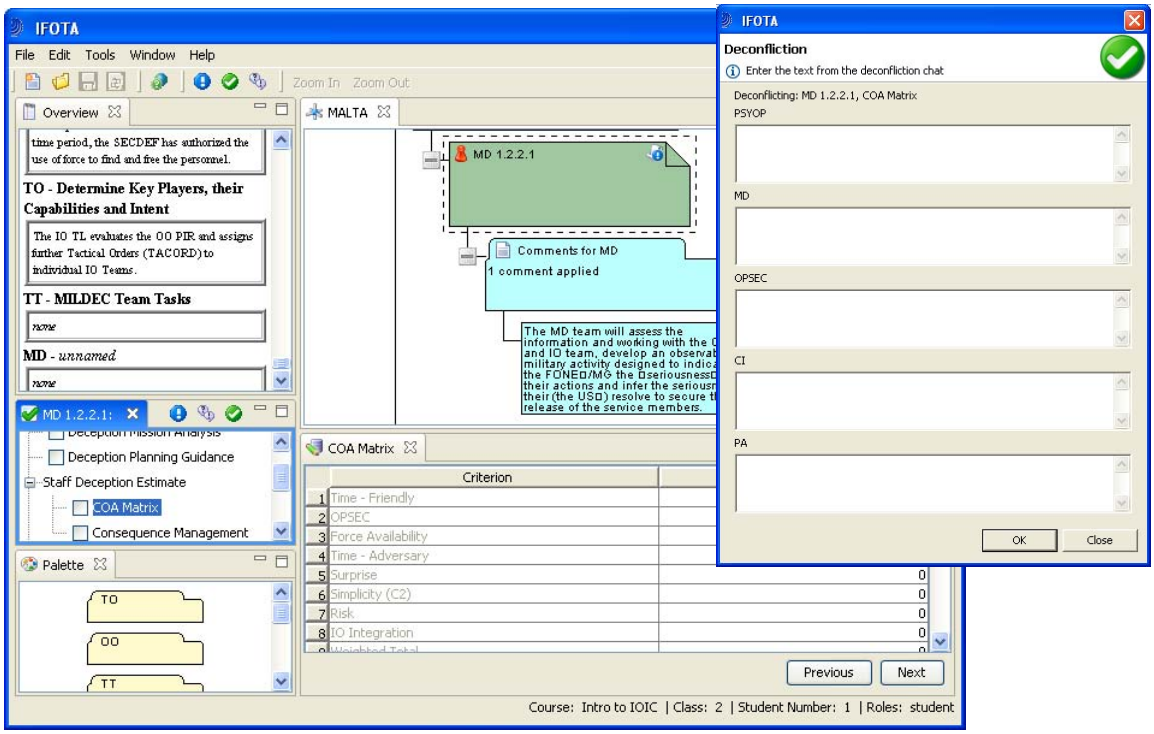

Figure 12. IFOTA 4.0 showing deconfliction of MD COA and COA weighting

The final IFOTA task also included development of several IFOTA-compatible scenarios for use in integrated IO training. The scenarios, which included anti-government and anti-US protest scenarios in several countries, a multinational peacekeeping scenario, a Petroleum, Oil and Lubricant (POL) contamination scenario, an ethnic tensions scenario and an espionage recruiting scenario, were delivered to the government separately.

5.1 IFOTA Technical Architecture

IFOTA technical maturity and enterprise scalability has progressed through releases. IFOTA 1.0 software used a two tiered client server architecture, with a Java Swing client and an Oracle Database. Java Data Base Connectivity (JDBC) was used to handle database transactions between client and database. The architecture's technical simplicity enabled rapid development responsiveness to user requirements. With more mature requirements, subsequent versions (2.0 through 4.0) utilized a three tiered architecture.

Figure 13 distinguishes the high-level components of the IFOTA architecture within its three-tiered architecture: a database tier, a business logic tier and a workstation/presentation tier. IFOTA uses an Oracle database system to handle the data persistence needs. A Java 2 Enterprise Edition (J2EE) middleware solution based on JBoss Application Server version 4 is used for the business logic processing needs. The workstation/presentation tier representing the user interface is built upon the Eclipse RCP.

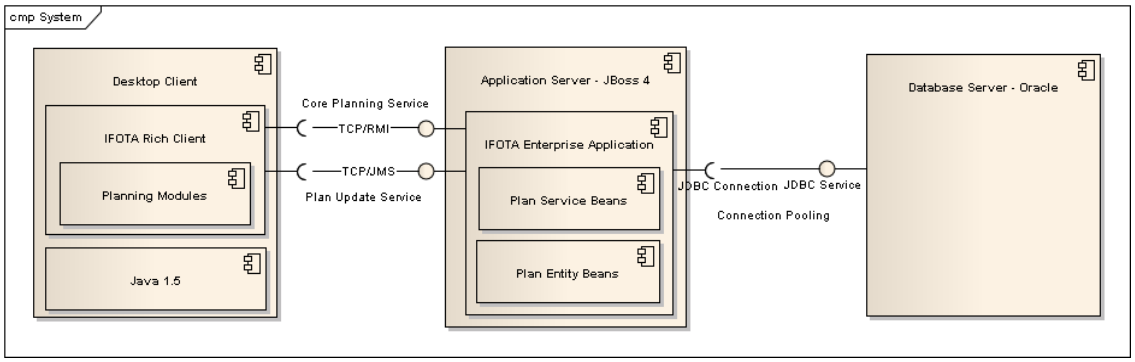

Figure 13. IFOTA 3-tiered architecture

The communication between the tiers is accomplished through a number of standards. Remote Method Invocation (RMI) is used as the main information transfer mechanism between the client and the JBoss server middleware. Java Messaging Service (JMS) is leveraged for the propagation of influence operation plan updates between the business logic services and the active listening clients. The persistence of data from the business logic tier to the database tier uses J2EE connection pooling and JDBC.

Data access/transfer object patterns were used to abstract data persistent implementations and transfer implementations from the business logic. Enterprise Java Beans (EJB) version 2.0 was used to define entity relationships and persistent properties to the data tier communication methods.

A façade design pattern is used to limit coupling between the client system and the business logic/application services. Stateless session beans are used to limit scalability barriers in the middle tier. Other J2EE best practices are leveraged throughout the middle tier, such as restricting direct communication with the file system. Figure 14 shows a system component view.

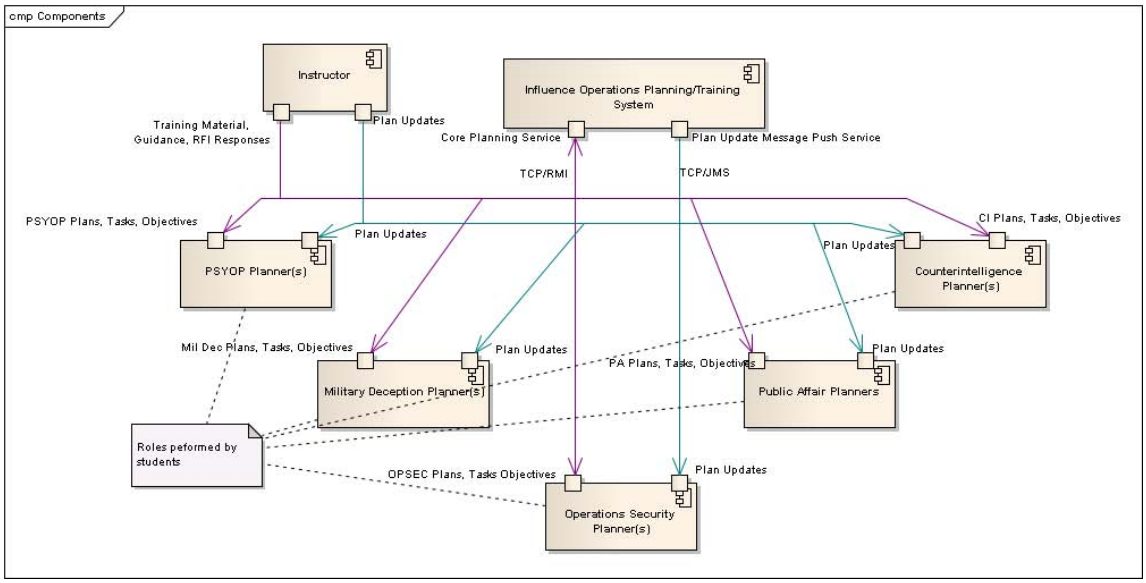

Figure 14. IFOTA system component view

IFOTA development employed UML for documenting of the IFOTA design. Appendix B provides key Use Case, Entity Relationship, and Class diagrams for the system. This documentation has been delivered in electronic format under separate cover.

5.1.1 Advanced Technical Features

The workstation/presentation tier uses the Eclipse RCP. The Eclipse RCP is built on the extendable Open Services Gateway Initiative (OSGI) service execution framework. The extendibility of this framework permits the use of extension points to provide a means for plug-ins/modules to insert capability at application defined points, referred to as extension points. IFOTA developed a node extension point and an exporter extension point. The node extension point was used to permit the introduction of new plan types, such as a refined PYSOP plan type or a custom military deception plan type. All plan types built within IFOTA use the node extension point to incorporate their plan type functions into the overarching IFOTA platform. The exporter extension point is used to incorporate plan product generators. The two plan product generators included in IFOTA are the PowerPoint presentation generator and the HTML generator. The PowerPoint presentation product generator (plan exporter) wraps Component Object Model (COM) functionality exposed by the Microsoft PowerPoint application libraries to create presentations. Figure 15 illustrates the IFOTA client stack.

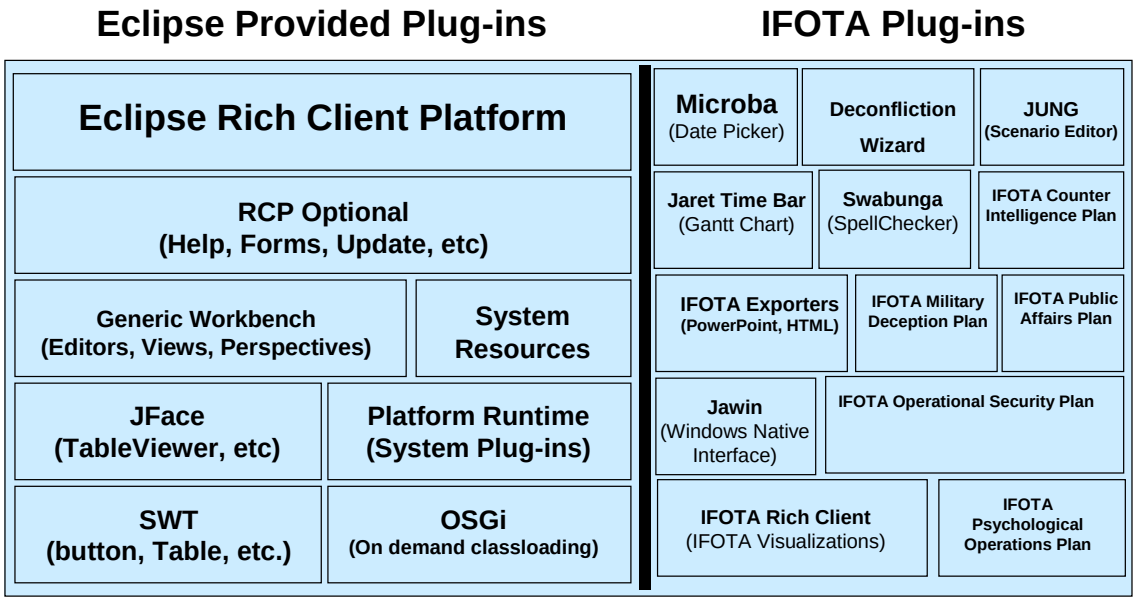

Figure 15. Client stack

IFOTA architecture included an advanced locking mechanism. It enabled users to specify locks onto planning elements to restrict editing by planning collaboration users, ideally when they needed to modify the plan. The locking mechanism worked based on a node level (as contrasted by the node property level or the whole plan locking level). JMS was used to propagate locking status changes among the collaboration users. J2EE Timers were used to force lock releases upon client inactivity for an extended period.

5.1.2 Rich Client Integration

Since the client leveraged the Eclipse RCP, the features and function of IFOTA can be integrated into other Eclipse RCP applications fairly easily. This is based on the fact IFOTA client itself being just a set of plug-ins sitting on the underlying Eclipse RCP. A proof-of-concept integration effort included a research and analysis toolkit integration with a 3D visualization application.

5.1.3 Training Environment Configuration

For the support of IFOTA use in training environments, a student number authentication system was implemented. A role selection mechanism was also used to define the student accessible aspects of the software, for example a student acting as a PSYOP planner would select the PSYOP planner role. The system would then restrict the student from taking part in activities not performed by this role, such as creating military deception plans. A special, super-user role was given to the authenticated instructor users. This role permitted instructor plan commenting activities, RFI responding activities, lesson book management, etc. The IFOTA server based architecture and asynchronous messaging enabled a distributed user collaboration environment. The Table 2 lists IFOTA software features.

Table 2. IFOTA Software Features

IFOTA Software Feature List
• Plan Deconfliction
• Threaded Discussions/Instructor Chat
• Discussion integrated into Plan View
• Comments applied onto step
• Wizards Checklists/Step Flags
• Modules
• Drag and Drop Palette
• Spell check capability
• Gantt Chart/Time Series Plan View/Editor
• Hierarchy Plan Relationship View/Editor
• Plan Status Indicators
• Dynamic Overview Reports
• Plan locking
• Plan creation based on plan type wizards
o PSYOP planning
o MD planning
o OPSEC planning
o PA Planning
o CI Planning

5.1.4 IFOTA System Requirements

In its IFOTA 4.0 configuration, IFOTA requires Java JRE version 1.5 or greater, an Oracle 10g database, and a Windows 2000 or XP Operating System.

6.0 DISCUSSION: WARFIGHTER ANALYSIS WORKSHOPS

IFOTA was demonstrated at the 2007 JFCOM Information Operations Planning Capability-Joint (IOPC-J) Warfighter Analysis Workshop, the 2008 Air Combat Command Warfighter Analysis of Innovative Technologies and Concepts (WAIT-C) interactive technology demonstration and at the 2006 and 2007 Phoenix Challenges. The general response was enthusiastic, as the tool's collaborative nature, its structured planning methodology and deconfliction tool, and its analysis framework and rationale documentation were all viewed as integral to coordinating joint planning efforts.

At the JFCOM IOPC-J Warfighter Analysis Workshop, IFOTA was reviewed by representatives from Air Force's 7th IOF, the Texas National Guard's 49th IO Group, the Army's 1st IO Command Tech Integration, and the Navy Information Operations Command 's (NIOC MD) Information Operations Strategy and Policy group. Capabilities queries involved addition of a Counterpropaganda module and a multilingual user interface. The WAIT-C demonstration allowed both AOC strategy planners and IO specialists to interact with IFOTA. Potential users from both groups were equally enthusiastic about the structured method and the documentation of the planner's rationale—a critical feature when working collaboratively. Other features that received positive response were embedded methods for weighting efforts and anticipating resistance/cooperation. The scenario-based training was considered an effective way to maintain readiness among teams with differing levels of expertise.

Phoenix Challenge Conferences are DoD-sponsored events that bring government, industry, academia, and coalition partners together to consider IO challenges and solutions. IO community representatives share information on and discuss ramifications of the latest IO policies, strategies, technologies, processes, legal issues, human capital, force structure, and education and training. The response at Phoenix Challenge 2006 and 2007 was positive. IO professionals expressed concerns with development of MOEs and MOPs for IO and IFO; tools, such as IFOTA, that prompt MOE and MOP development are desired. The scenario-based training and checklist guided methodology were well received.

The desirability of extending IFOTA to incorporate the full range of IO planning was discussed by IO representatives at both the Warfighter Analysis Workshops and the Phoenix Challenges. IO tools, such as IOPC-J, are future efforts. While there is a desire to "train as we fight" (i.e., use deployed tools such as Information Warfare Planning Capability, IWPC), there is also an acknowledgment that the current tools do not completely fill IO planner needs, and what will be available in the future cannot be considered helpful today. The IO community seeks solutions that both support their unique planning needs and integrate well with traditional planning methods. The 39th IOS, in its well-considered requirements expression, sought to make IFOTA the bridge.

7.0 CONCLUSION/RECOMMENDATIONS

IFOTA 4.0 is a working prototype for planning and documenting IFO in a training environment. Based on specific requests from the 39th IOS IOIC course instructors, IFOTA is a scenario-based collaborative training environment featuring drag-and-drop plan building supplemented by a reconfigurable (data-driven) Visual Checklist that guides IO students and practitioners through the textbook methodology (including deconfliction) for PSYOP, MD, OPSEC, PA and CI disciplines. A built-in operational taxonomy provides decision support for plan development. A dynamically updated Gantt Chart (Time-Series View) provides a temporal window on plan sequencing. A built-in dual PowerPoint/HTML briefing generator saves time and effort creating decision briefs. Instructor features include a Lesson Plan/Course Repository, Maintenance of Acronyms and Definitions, Links to External Planning Resources, RFI simulation, and printable Quick Look Books. Table 3 shows the primary requirement to capability mapping for IFOTA.

Table 3. Requirement to Capability Mapping

Requirement	**IFOTA Capability**
Open architecture	Open architecture built around Eclipse RCP, J2EE, JBOSS
Helps planners develop viable IO options	Decision aids and built-in taxonomy supported by data-driven Visual Checklist reinforces strategy-to-task planning methodology
Collaborative capabilities	J2EE with locking mechanism allows multiple clients to work in the same scenario simultaneously across geographical locations while enabling real-time data sharing between users
Deconfliction	Integrated plans can be deconflicted using IFOTA's plug-in wizard
Plan-to-assessment approach / Assessment Planning	MOEs and MOPs incorporated into plan; tool allows for iterative planning process to allow assessment of plans upon completion; can annotate intel assessment
Break down objectives	IFOTA allows users to break objectives and Commander's intent into tasks, subtasks, targets, target audience analysis, desired effects, MOPs, MOEs, associated MOE indicators
Provide COCOMS the capability to plan and assess integrated IO plans through manual means	Built-in PowerPoint generator and HTML export tool for generating manual documents to enhance communications
COA Development	Ability to understand target audience, generate possible effects-based actions, and select ultimate planning requirement
Visualizations	Drag and drop scenario development with associated pull-down and right-click menus; time-series views, ability to develop additional visualizations leveraging Eclipse RCP and IFOTA IFO-specific data
Strategy-to-Task Planning	Data-driven Visual Checklist enhances user effectiveness by allowing non-linear progression while enforcing completion of strategy-to-task planning

Time Synchronization	Gantt chart/time-series view built in
Reachback Support	Connectivity to CIA World Factbook, Reardon Group (or current provider), Other External Links
Modular and Scalable	All Modules (PSYOP, PA, MD, CI, OPSEC, Instructor) can be turned on/off; additional modules can be easily plugged in

The uniformly positive responses to IFOTA suggest that the 39th IOS has defined the IO planning support needs well. Extension of IFOTA to incorporate all of the IO disciplines is needed to complete it; due to the great interest in and need for effective IO planning tools, it is highly recommended that IFOTA be reviewed for inclusion in the next IO system of record. Although DoD software development is moving more toward thin-client applications, with the advances in support to service-oriented architectures, IFOTA can be relatively easily rethought to provide a similar level of support in a web-based application. In a thin client format, the IFOTA functions would fill a gap in cognitive-based tool support for IO training. It will benefit the IO community if the insights of those IO experts who contributed to IFOTA's requirements development are not lost. It will benefit the IO community if the collaborative support provided through IFOTA's concept of tracking plan rationale is retained.

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APPENDIX A
IFOTA REQUIREMENTS

The following requirements were derived from discussions with the 39th IOS and selected subject matter experts and from official training and doctrine documents. Requirements were prioritized and implemented incrementally as IFOTA was developed. Note that not all requirements were approved for funding during the period of performance. They are included here to illustrate the features that were considered desirable.

ID	Requirement Type	Requirement Statement
1	Module: Help System	The Help System shall provide directions on how to use IFOTA
2	Module: Help System	The Help System shall provide links to support material provided by the 39th IOS (i.e., URLs on JWICS, SIPRNet, etc.) The instructors will add/update this list via the Instructor Module.
3	Module: Help System	The Help System shall provide definitions of all terms used in the software. The instructors will add/update the definitions list via the Instructor Module.
4	Module: Help System	The Help System shall provide examples of each write-in box (i.e., justification/citation boxes)
5	Module: Help System	The Help System shall provide contextual help for each user activity (i.e., right-click or click-question-mark-then-click-item-you-want-help-on)
6	Module: Help System	The Help System shall include explanations for all menu items and buttons.
7	Module: Help System	The Help System shall identify names and functions of all software panes and frames. Use title bars on all windows.
8	Module: Help System	The Help System shall identify how to regain closed software panes and frames.
9	Module: Help System	The Help System shall provide instruction on how to customize the toolbar.
10	Module: Help System	The Help System shall provide instruction on how to revert the toolbar back to standard.
11	Module: Help System	The Help System shall include compilations of all individual contextual help entries. (In other words, everything that's included in the contextual help will also be included in the definitions/acronyms, index, etc. of the actual full-blown Help system.
12	Module: Help System	The Help System shall contain explanations for all algorithms.
13	Module: Help System	The Help System shall contain explanations for how to deconflict tasks.
14	Module: Help System	The Help System shall contain explanations for how to use results displays.

15	Module: Help System	The Help System shall contain explanations for how to alter influence factors to change algorithm results.
16	Module: Help System	The IFOTA shall provide a platform-independent Help System
17	Module: Help System	The IFOTA shall allow Help to remain onscreen while the user is working in the IFOTA program. (Perhaps a floating window that can be closed.)
18	Module: Help System	The IFOTA Help screens shall be dockable/undockable
19	Module: Help System	The IFOTA Help screens shall be resizable
20	Module: Help System	The IFOTA shall allow the user to print Help entries (without having to print the entire help system)
21	Module: Help System	The IFOTA shall provide contextual help at all decision points
22	Module: Help System	The IFOTA shall provide contextual help in the form of "on-demand" popups
23	Module: Help System	The IFOTA shall access dialog box contextual help using a question mark icon
24	Module: Help System	The IFOTA shall provide contextual help in the form of text definitions for course vocabulary items
25	Module: Help System	The IFOTA shall highlight text entries that have associated contextual help, if available.
26	Module: Help System	The IFOTA shall access highlighted contextual help items by doubleclicking on highlighted text
27	Module: Help System	The Help System shall remain open until it is manually closed by the user.
28	Module: Help System	The Help System shall instruct the user how to navigate within a scenario
29	Module: Help System	The Help System shall include selected sections of each instructors' lesson notes (to be input by the 39th IOS).
30	Module: Help System	The Help System shall be navigable by hyperlink to additional help topics.
31	Module: Help System	The Help System shall provide a search feature.

32	Module: Instructor	The Instructor Module shall allow the instructor to view student activities in near real-time as the student's work is saved.
33	Module: Instructor	An Instructor Module shall have a separate login feature.
34	Module: Instructor	The Instructor Module shall have a separate interface.
35	Module: Instructor	The Instructor Module shall allow the instructor to enter new data into the databases.
36	Module: Instructor	The Instructor Module shall allow the instructor to change data in the databases.
37	Module: Instructor	The IFOTA shall allow instructors to view students' work in real time
38	System: General	The IFOTA shall associate a workgroup identification and a student identification with each saved scenario
39	System: General	The IFOTA shall capture justifications and references for student's work
40	Module: Instructor	The IFOTA shall allow instructors to modify (add/delete/change) the student's plan and save modifications to the database.
41	Module: Instructor	The IFOTA shall allow the instructor to notify the student that the instructor has annotated the student's work
42	Module: Instructor	The IFOTA shall allow the student to transfer to the modified file
43	Module: Instructor	The IFOTA shall capture grades for student work
44	Module: Instructor	The IFOTA shall capture student actions in a readable log file
45	Module: Instructor	The IFOTA shall permit instructors to create scenario templates
46	Module: Instructor	The IFOTA shall permit instructors to modify scenario templates
47	Module: Instructor	The IFOTA shall allow instructors to modify scenario data
48	Module: Instructor	The IFOTA shall allow instructors/staff to create new scenarios

49	Module: Instructor	The IFOTA shall provide a method for testing students
50	Module: Instructor	The IFOTA shall provide a method for annotating tests
51	Module: Instructor	The IFOTA shall provide a method for calculating grades for each test or exercise
52	Module: Instructor	The IFOTA shall capture summary/final grades
53	Module: Instructor	The Instructor Module shall allow the instructor to delete data from the databases.
54	Module: MD	A module shall be built to encompass the planning aspect of Military Deception (MD).
55	Module: MD	The IFOTA shall provide example MD-specific tactical support tasks
56	Module: MD	The IFOTA shall allow the user to select multiple tactical supporting task(s) for each tactical task
57	Module: MD	The IFOTA shall allow the user to enter their own tactical supporting tasks
58	Module: MD	The IFOTA shall provide space to insert measures of performance (MOPs) for each tactical supporting task
59	Module: MD	The IFOTA shall provide example MOPs
60	Module: MD	The IFOTA shall link to MD supporting references (simulating reachback and SIPRNET)
61	Module: RFI	The IFOTA shall capture RFIs needed to perform assessment
62	Module: MD	The IFOTA shall pop up deconfliction/coordination screen after tactical support task(s) are selected
63	Module: MD	The IFOTA shall allow the user to identify target audience
64	Module: MD	The IFOTA shall pop up deconfliction/coordination screen after target audience is selected
65	Module: MD	The IFOTA shall allow the user to input current perception

66	Module: MD	The IFOTA shall prompt the user to select perception management objective (create/change/maintain)
67	Module: MD	The IFOTA shall allow the user to input desired perception (descriptive action title)
68	Module: MD	The IFOTA shall allow the user to input detailed storyline
69	Module: MD	The IFOTA shall pop up deconfliction/coordination screen after storyline is developed
70	Module: MD	The IFOTA shall allow the user to select from a dropdown list of means
71	Module: MD	The IFOTA shall categorize means as Administrative, Technical, or Physical
72	Module: MD	The IFOTA shall pop up deconfliction/coordination screen after means are selected
73	Module: MD	The IFOTA shall allow the user to input "Special Actions"
74	Module: MD	The IFOTA shall capture justification for target audience selection
75	Module: MD	The IFOTA shall capture justification for perception management plan (desired perception, story, and means)
76	Module: MD	The IFOTA shall allow the user to describe the action termination plan
77	Module: MD	The IFOTA shall allow the user to identify termination cue and termination cover story (as appropriate)
78	Module: MD	The IFOTA shall allow the user to identify termination authority
79	Module: MD	The IFOTA shall allow the user to identify what information can be released/when
80	Module: MD	The IFOTA shall allow the user to identify what conduits need to be terminated/continued
81	Module: MD	The IFOTA shall capture justification for action termination plan
82	Module: MD	The IFOTA shall display an Event Schedule based on Joint Pub 3-58 plus Location/Target

83	Module: MD	The IFOTA shall pop up deconfliction/coordination screen after the Event Schedule is created
84	Module: RFI	The IFOTA shall capture collection requests (RFIs) for course of action assessment (feedback)
85	Module: MD	The IFOTA shall capture/display feedback
86	Module: MD	The IFOTA shall display feedback in a table similar to the Event Schedule (ID#, Objective, Time, Action/Means, Unit, Location/Target, feedback)
87	Module: MD	The IFOTA shall distinguish feedback as MOP (did the story get out) and MOE (did the target respond as desired)
88	Module: MD	The IFOTA shall provide a MOPs chart listing Event, Unit, Scheduled DTG, % Completed, Feedback channels
89	Module: MD	The IFOTA shall provide a termination assessment
90	Module: MD	The IFOTA shall provide an MD summary relating MD tasks and MOPs to tactical tasks/MOPS and tactical objectives/MOEs
91	Module: MD	The IFOTA shall permit the student to deconflict across planning cycle and operational phases
92	Module: OPSEC	The IFOTA shall provide example OPSEC-specific tactical support tasks
93	Module: OPSEC	The IFOTA shall allow the user to select multiple tactical support task(s) for each tactical task
94	Module: OPSEC	The IFOTA shall allow the user to enter their own tactical support tasks
95	Module: OPSEC	The IFOTA shall provide space to insert MOPs for each tactical support task
96	Module: OPSEC	The IFOTA shall give an example measure of performance (MOP)
97	Module: OPSEC	The IFOTA shall pop up deconfliction/coordination screen after tactical support task(s) are selected
98	Module: OPSEC	The IFOTA shall link to OPSEC supporting references (simulating reachback and SIPRNET)
99	Module: RFI	The IFOTA shall capture RFIs needed to perform assessment

100	Module: OPSEC	The IFOTA shall allow the user to identify Critical Information (subset of Essential Element of Friendly Information - EEFIs) from a dropdown list
101	Module: OPSEC	The IFOTA shall allow the user to enter Critical Information items
102	Module: OPSEC	The IFOTA shall capture justification for Critical Information identification
103	Module: OPSEC	The IFOTA shall allow the user to identify target audience
104	Module: OPSEC	The IFOTA shall pop up deconfliction/coordination screen after target audience is selected
105	Module: OPSEC	The IFOTA shall allow the user to identify OPSEC measures from a dropdown list
106	Module: OPSEC	The IFOTA shall allow the user to identify interactions and unintended consequences from employment of OPSEC measures
107	Module: OPSEC	The IFOTA shall allow the user to develop OPSEC primary and secondary countermeasures
108	Module: OPSEC	The IFOTA shall allow the user to identify MOPs and MOEs
109	Module: RFI	The IFOTA shall capture RFIs needed to perform assessment
110	Module: OPSEC	The IFOTA shall capture justification for the OPSEC plan
111	Module: OPSEC	The IFOTA shall pop up deconfliction/coordination screen after OPSEC COA is selected
112	Module: OPSEC	The IFOTA shall allow the user to identify adversary Threats from a dropdown list
113	Module: OPSEC	The IFOTA shall allow the user to enter Threat types
114	Module: OPSEC	The IFOTA shall allow the user to identify OPSEC Indicators from a dropdown list
115	Module: OPSEC	The IFOTA shall allow the user to enter OPSEC Indicators
116	Module: OPSEC	The IFOTA shall allow the user to identify and analyze Vulnerabilities from a dropdown list

117	Module: OPSEC	The IFOTA shall allow the user to enter Vulnerabilities
118	Module: OPSEC	The IFOTA shall capture justification of the way and the circumstances in which the Indicator is a Vulnerability
119	Module: OPSEC	The IFOTA shall allow the user to assess risk using an algorithm to factor in levels of Threat, Vulnerability and Impact
120	Module: OPSEC	The IFOTA shall use scales (e.g., 5-pt scale) to capture user assessments for threat, vulnerability, and impact
121	Module: OPSEC	The IFOTA shall provide a risk summary
122	Module: OPSEC	The IFOTA shall allow the user to provide a cost/benefit analysis
123	Module: OPSEC	The IFOTA shall capture collection requests for course of action assessment (feedback)
124	Module: OPSEC	The IFOTA shall provide an OPSEC summary relating OPSEC tasks and MOPs to tactical tasks/MOPS and tactical objectives/MOEs
125	Module: OPSEC	The IFOTA shall permit the student to deconflict across planning cycle and operational phases
126	Module: PA	A module shall be built to encompass the planning component of PA.
127	Module: PA	The IFOTA shall provide example PA-specific tactical support tasks
128	Module: PA	The IFOTA shall allow the user to select multiple tactical support task(s) for each tactical task
129	Module: PA	The IFOTA shall allow the user to enter own tactical support tasks
130	Module: PA	The IFOTA shall provide space to insert MOPs for each tactical support task
131	Module: PA	The IFOTA shall give an example measure of performance (MOP)
132	Module: RFI	The IFOTA shall capture RFIs needed to perform assessment
133	Module: PA	The IFOTA shall pop up deconfliction screen after tactical support task(s) are selected

134	Software: General	The IFOTA shall capture/display unifying themes
135	Module: PA	The IFOTA shall allow the user to enter own message for each plan
136	Module: PA	The IFOTA shall pop up a deconfliction screen after messages and themes are selected
137	Module: PA	The IFOTA shall capture justification for theme/symbol selection
138	Module: PA	The IFOTA shall link to PA supporting references
139	Module: PA	The IFOTA shall allow the user to identify Critical Information (subset of EEFIs) from a dropdown list
140	Module: PA	The IFOTA shall allow the user to enter Critical Information items
141	Module: PA	The IFOTA shall capture justification for selection of Critical Information items
142	Module: PA	The IFOTA shall capture whether the student is in proactive or reactive mode
143	Module: PA	The IFOTA shall capture whether the student is planning a passive or active information campaign
144	Module: PA	The IFOTA shall capture justification for decision to react/not react
145	Module: RFI	The IFOTA shall generate RFIs needed to fill knowledge gap
146	Module: PA	The IFOTA shall allow the user to select a target audience
147	Module: PA	The IFOTA shall allow the user to enter a target audience
148	Module: PA	The IFOTA shall capture justification for target audience selection
149	Module: PA	The IFOTA shall pop up deconfliction screen after target audience is selected
150	Module: PA	The IFOTA shall provide a dropdown list of example target actions

151	Module: PA	The IFOTA shall allow the user to enter own target action
152	Module: PA	The IFOTA shall allow the user to select/enter target action
153	Module: PA	The IFOTA shall capture Situation Description and response justification (Information, T/F, Source, Response, Rationale)
154	Module: PA	The IFOTA shall pop up deconfliction screen after response is selected
155	Module: PA	The IFOTA shall capture Dissemination Plan (Response, Means, Methods, Timing)
156	Module: PA	The IFOTA shall pop up deconfliction screen after response plan is delineated
157	Module: PA	The IFOTA shall capture MOPs and MOEs
158	Module: RFI	The IFOTA shall capture RFIs needed to perform assessment
159	Module: PA	The IFOTA shall capture simulated response effectiveness (Response, Measures of Effectiveness)
160	Module: PA	The IFOTA shall provide a PA summary relating PA tasks and MOPs to tactical tasks/MOPS and tactical objectives/MOEs
161	Module: PA	The IFOTA shall permit the student to deconflict across planning cycle and operational phases
162	Module: PSYOP	The IFOTA shall provide example PSYOP-specific tactical support tasks
163	Module: PSYOP	The IFOTA shall allow the user to select multiple tactical support task(s) for each tactical task
164	Module: PSYOP	The IFOTA shall allow the user to enter own tactical support tasks
165	Module: PSYOP	The IFOTA shall provide space to insert MOPs for each tactical support task
166	Module: PSYOP	The IFOTA shall give an example measure of performance (MOP)
167	Module: RFI	The IFOTA shall capture RFIs needed to perform assessment

168	Module: PSYOP	The IFOTA shall pop up deconfliction screen after tactical support task(s) are selected
169	Module: PSYOP	The IFOTA shall capture/display themes and symbols for each branch
170	Module: PSYOP	The IFOTA shall allow the user to enter own message and theme for each plan
171	Module: PSYOP	The IFOTA shall pop up a deconfliction screen after messages and themes are selected
172	Module: PSYOP	The IFOTA shall capture justification for theme/symbol selection
173	Module: PSYOP	The IFOTA shall list (or link to) target audiences and specific political/sociocultural and demographic information
174	Module: PSYOP	The IFOTA shall allow the user to select a target audience
175	Module: PSYOP	The IFOTA shall allow the user to enter a target audience
176	Module: PSYOP	The IFOTA shall capture justification for target audience selection
177	Module: RFI	The IFOTA shall generate RFIs needed to fill knowledge gap
178	Module: PSYOP	The IFOTA shall pop up deconfliction screen after target audience is selected
179	Module: PSYOP	The IFOTA shall provide a dropdown list of example target actions
180	Module: PSYOP	The IFOTA shall allow the user to enter own target action
181	Module: PSYOP	The IFOTA shall allow the user to select/enter target action
182	Module: Help System	The IFOTA shall provide example MOPs/MOEs
183	Module: PSYOP	The IFOTA shall allow the user to enter MOEs
184	Module: PSYOP	The IFOTA shall capture collection requests for target action assessment

185	Module: PSYOP	The IFOTA shall capture justification for how target action supports messages/themes/symbols
186	Module: PSYOP	The IFOTA shall pop up deconfliction screen after target action is selected
187	Module: PSYOP	The IFOTA shall list target audience/target action specific situational/cultural factors
188	Module: PSYOP	The IFOTA shall provide default selection of applicable situational/cultural factors (from embedded knowledge)
189	Module: PSYOP	The IFOTA shall allow the user to modify applicable situational/cultural factors
190	Module: PSYOP	The IFOTA shall allow the user to enter own situational/cultural factors
191	Module: PSYOP	The IFOTA shall list possible situational/cultural conditions (from embedded knowledge)
192	Module: PSYOP	The IFOTA shall allow the user to select applicable conditions
193	Module: PSYOP	The IFOTA shall allow the user to enter new conditions
194	Module: PSYOP	The IFOTA shall capture user's prioritization (ranking) of conditions (vulnerabilities)
195	Module: PSYOP	The IFOTA shall capture user's relative weighting of conditions (susceptibilities)
196	Module: PSYOP	The IFOTA shall capture user's Red/Yellow/Green (stoplight metaphor) assessment
197	Module: PSYOP	The IFOTA shall allow the user to skip SMART model and go directly to delivery method selection
198	Module: PSYOP	The IFOTA shall collect SMART model decision criteria
199	Module: PSYOP	The IFOTA shall use scales to capture user assessments required for SMART model
200	Module: RFI	The IFOTA shall generate RFIs needed to fill SMART criteria knowledge gap
201	Module: PSYOP	The IFOTA shall display SMART model evaluations

202	Module: PSYOP	The IFOTA shall allow the user to modify SMART model inputs and rerun algorithm
203	Module: PSYOP	The IFOTA shall provide an example list of delivery methods
204	Module: PSYOP	The IFOTA shall allow the user to select/write a delivery method
205	Module: PSYOP	The IFOTA shall pop up deconfliction screen after delivery method is selected
206	Module: PSYOP	The IFOTA shall provide a PSYOP summary relating PSYOP tasks and MOPs to tactical tasks/MOPs and tactical objectives/MOEs
207	Module: PSYOP	The IFOTA shall capture collection requests for course of action assessment
208	Module: PSYOP	The IFOTA shall permit the student to deconflict across planning cycle and operational phases
209	Software: General	The IFOTA shall include icons to customize the tool bar to include any function
210	Software: General	The IFOTA shall open each new work session with the JWICS regional commands map
211	Software: General	The IFOTA shall display the scenarios by region (and country) when you click on the map
212	Software: General	The IFOTA shall link to basic political and sociocultural information for each country
213	Software: General	The IFOTA shall allow the user to select the scenarios associated with a single country
214	Software: General	The IFOTA shall display a map for each country
215	Software: General	The IFOTA shall link to demographic, political and sociocultural information for each distinct region within the country
216	Software: General	The IFOTA shall open each scenario and immediately display the summary sheet
217	Software: General	The IFOTA shall provide a list of combined operational tasks organized by service and operational phase
218	Software: General	The IFOTA shall provide example success indicators for each operational objective

219	Software: General	The IFOTA shall allow the user to select/write multiple operational objective(s) and success indicators
220	Software: General	The IFOTA shall provide an example list of Air Force tactical objectives organized by service it supports
221	Software: General	The IFOTA shall provide example measures of effectiveness (MOEs) for each tactical objective
222	Software: General	The IFOTA shall allow the user to select/write multiple tactical objectives
223	Software: General	The IFOTA shall allow the user to select/write MOEs for each objective
224	Software: General	The IFOTA shall provide an example list of Air Force tactical tasks organized by service it supports
225	Software: General	The IFOTA shall provide example measures of performance (MOPs) for each tactical task
226	Software: General	The IFOTA shall allow the user to select/write multiple tactical tasks
227	Software: General	The IFOTA shall allow the user to select/write MOPs for each task
228	Software: General	The IFOTA shall allow the user to enter own tactical tasks
229	Software: General	The IFOTA shall allow the user to enter own MOPs
230	Software: General	The IFOTA shall show task branches
231	Software: General	The IFOTA shall allow the user to create task branches
232	Software: General	The IFOTA scenario shall identify the current planning stage
233	Software: General	The IFOTA scenario shall identify the current operational phase
234	Software: General	The IFOTA shall have a status screen that summarizes current status for each module
235	Software: General	The IFOTA shall display current information from each module on the summary screen(s)

236	Software: General	The IFOTA shall display information from each module from the following fields on the summary screen(s): operational objective, SI, tactical objective, MOE, tactical task, MOP, tactical support task, MOP, target audience, target action, rationale, link to synchronization matrix
237	Software: General	The IFOTA shall pull summary information from the corresponding data entry fields in each individual module
238	Software: General	The IFOTA shall update the summary plan automatically whenever any data that feed the summary fields change
239	Software: General	The IFOTA shall have a deconfliction version of the summary screen with checkboxes to indicate deconfliction has been accomplished
240	Module: Deconfliction	The IFOTA shall have a deconfliction/coordination feature that prompts the user to deconflict/coordinate with other disciplines
241	Module: Deconfliction	The IFOTA shall display the deconfliction screen whenever the student reaches an identified deconfliction point in the process
242	Module: Deconfliction	The IFOTA shall have a deconfliction button that brings up the summary/deconfliction screen at user command
243	Module: Deconfliction	The IFOTA shall use the status screen for the deconfliction/coordination function
244	Module: Deconfliction	The IFOTA shall display checkboxes by each deconfliction action in the deconfliction function
245	Module: Deconfliction	The IFOTA shall timestamp each deconfliction/coordination action
246	Module: Deconfliction	The IFOTA shall allow the student to enter the deconfliction action whenever the student fills in a deconfliction checkbox
247	Module: Deconfliction	The IFOTA shall allow the student to enter the deconfliction rationale whenever the student fills in a deconfliction checkbox
248	Module: Deconfliction	The IFOTA shall not allow the student to proceed until the student has checked each box and entered text in each action description text field
249	Software: General	The IFOTA shall permit the user to manage multiple windows
250	Software: General	The IFOTA shall allow the user to tile windows horizontally and vertically
251	Software: General	The IFOTA shall allow the user to resize all windows
252	Software: General	The IFOTA shall allow the user to move all windows

253	Software: General	The IFOTA shall allow the user to close all windows
254	Software: General	The IFOTA shall allow the user to minimize all windows
255	Software: General	The IFOTA shall allow the user to move freely between windows
256	Software: General	The IFOTA shall include a toggle capability to enlarge window in which student is working
257	Software: General	The IFOTA shall allow the user to tab between windows
258	Module: RFI	The IFOTA shall provide a Coliseum RFI template
259	Module: RFI	The IFOTA shall provide the means to make other RFI templates
260	Module: RFI	The IFOTA shall allow the user to draft RFIs to obtain information necessary to complete scenario tasks
261	Module: RFI	The IFOTA shall capture RFIs for instructor
262	Module: RFI	The IFOTA shall simulate tracking RFI status
263	Module: RFI	The IFOTA shall allow the user to create assessment collection RFIs
264	System: General	IFOTA shall be designed to work in a secure environment.
265	System: General	IFOTA shall be designed to work in a secure environment.
270	System: General	The IFOTA shall store login information.
271	Software: General	All text boxes shall have an auto-wrap feature.
272	Software: General	All text boxes shall have a scroll-bar feature that becomes active when necessary.
273	Software: General	The IFOTA shall have a Windows look and feel

274	Software: General	The IFOTA shall have a main menu with submenus and toolbar with icon buttons
275	Software: General	The IFOTA shall use portions of the DIICOE and Xerox usability standards as guidelines for software development.
276	Software: General	The IFOTA shall open to a blank window
277	Software: General	The IFOTA shall provide a scenario chooser to display existing scenarios for selection
278	Software: General	The IFOTA shall provide scenario search capability
279	Software: General	The IFOTA shall provide a login function
280	Software: General	The IFOTA shall allow the user to open existing scenarios
281	Software: General	The IFOTA shall allow the user to create new scenarios
282	Software: General	The IFOTA shall allow the user to save their work to the database
283	Software: General	The IFOTA shall allow the user to modify their work according to permissions
284	Software: General	The IFOTA shall ensure students can't overwrite scenarios from library
285	Software: General	The IFOTA shall allow students to modify (add/delete/change) their own work
286	Functionality: Print	The IFOTA shall allow the user to print whole scenarios
287	Functionality: Print	The IFOTA shall allow the user to suppress printing SMART input screens
288	Functionality: Print	The IFOTA shall allow the user to suppress printing SMART results
289	Functionality: Print	The IFOTA shall allow the user to print the scenario summary
290	Functionality: Print	The IFOTA shall allow the user to print single/multiple page(s)

291	Functionality: General	The IFOTA shall allow cut, copy, and paste between fields, screens, windows and programs
292	Functionality: General	The IFOTA shall allow unlimited undo/redo for all text entries
293	Module: Help System	The IFOTA shall provide contextual help
294	Module: Help System	The IFOTA shall provide a preliminary glossary that the instructor can add to at any time.
295	Module: Help System	The IFOTA shall display software version and PM/Developer contact information under Help:About IFOTA
296	Functionality: General	The IFOTA shall display descriptive titles on all windows and dialog boxes
297	Functionality: Navigation	The IFOTA shall permit the user to open, manage, and work in multiple windows
298	System: General	The IFOTA shall permit the user to open multiple scenarios simultaneously
299	Software: General	The IFOTA shall allow the user to open multiple modules in multiple windows
300	Software: General	The IFOTA shall allow the user to open multiple screens of the same module
301	Software: General	The IFOTA shall allow the user to open old scenarios concurrent with new scenario
302	Functionality: Navigation	The IFOTA shall allow the user to navigate through screens in a maximum of 5 steps
303	Module: Help System	The IFOTA shall use terminology that meets 39th IOS approval
304	Module: Help System	The IFOTA shall use procedures that meet 39th IOS approval
305	Software: General	The IFOTA shall identify and keep track of where each planner is within the 5 operational phases
306	Software: General	The IFOTA shall identify and keep track of where each planner is within the 72--hour planning cycle
307	Software: General	The IFOTA shall display plans across operational phases and planning cycles

308	Software: General	The IFOTA shall accept and maintain integrity of task branches
309	Software: General	The IFOTA shall have a summary screen for each module
310	Module: Deconfliction	The IFOTA shall have a deconfliction/coordination function
311	Software: General	The IFOTA shall recognize workgroup members
312	Software: General	The IFOTA shall allow workgroup members to view each others' work
313	Functionality: Chat	The IFOTA shall allow chat-style communication between workgroup members
314	Functionality: Chat	The IFOTA shall capture chat communication between workgroup members
315	Software: General	The IFOTA shall allow students to enter their own decision selections
316	System: General	The IFOTA shall provide graceful degradation
317	System: General	The IFOTA shall be designed to be extensible
318	Functionality: Print	The system shall provide a print-preview function.
319	Functionality: General	The system shall allow the user to save a scenario as a new name, at any point.
320	Functionality: General	The system shall allow the user to save their scenario and continue working on it.
321	Functionality: General	The IFOTA shall prompt the student to login (appropriate permissions will be keyed to login)
322	Functionality: General	The IFOTA shall identify types of users and work group members through coded logins
323	System: General	The IFOTA shall prompt the student to select a module in the login screen
324	System: General	The IFOTA shall use login information to direct file save paths

325	System: General	The IFOTA shall provide scenario search capability on a single screen through a clickable world map and a text-based search function
326	System: General	The IFOTA shall provide a geographically-based scenario search capability through a MAJCOM map that permits the user to drill down to specific countries and local areas to obtain the scenario files for the chosen area.
327	System: General	The IFOTA shall provide a text search capability that permits the user to obtain the scenarios for specific ethnocultural groups, tactical tasks, discipline-specific tasks, or geographic locales
328	System: General	The IFOTA shall prompt the scenario creator/modifier to tag the scenario by geographic locale, ethnocultural group, and tactical/support tasks
329	System: General	The IFOTA shall permit the scenario to be opened from the scenario search results display
330	Software: General	The IFOTA shall provide access to all functions through a menu bar with main menus and submenus
331	Software: General	The IFOTA shall display keystroke combination shortcuts for actions on the submenus
332	Module: Help System	The IFOTA shall identify icon function with hovertext
333	Software: General	The IFOTA shall provide alternate access to frequently used functions through a tool bar
334	System: General	The IFOTA shall be able to be installed and run on a JWICS system
335	Module: Help System	The IFOTA shall provide a Help function
336	System: General	The IFOTA shall have PSYOP, MD, OPSEC, and PA modules
337	System: General	The IFOTA shall include a CI module
338	System: General	The IFOTA shall have a module that accepts/displays EW and NW planning entries
339	Module: Instructor	The IFOTA shall have an Instructor module
340	Module: RFI	The IFOTA shall provide an RFI management function
341	System: General	The IFOTA shall be designed to facilitate integration with IOPC-J

342	Software: General	The system shall support a mult-user environment.
343	Software: General	The system shall support an individual user environment.
344	Software: General	The system shall support a concurrent user environment.
345	Software: General	The IFOTA shall have a graceful shutdown process.
346	Software: General	Entrance into the IFOTA software shall be gained by double-clicking on an IFOTA icon.
347	Software: General	The initial IFOTA screen shall display a splash screen.
348	Software: General	The IFOTA shall have an autosave function.
349	Software: General	The IFOTA shall provide meaningful error messages with instructions.
350	Software: General	The IFOTA shall permit simultaneous access by multiple users to one scenario.
351	Software: General	The IFOTA shall have a login feature.
352	Software: General	The IFOTA shall have a 'student' permissions level.
353	Software: General	The IFOTA shall have an 'instructor' permissions level.
354	Software: General	The IFOTA shall have an 'admin' permissions level.
355	Software: General	The IFOTA shall allow the user to save his work in a directory specified by the user.
356	Software: General	The IFOTA shall be platform independent.
357	Software: General	The IFOTA shall provide a backup feature.
358	Functionality: Print	The system shall have a print function.

359	System: General	The system shall allow the user to generate a new scenario.
360	System: General	The system shall allow the user to open existing scenarios.
361	System: General	The sytem shall have a spell check feature for all user-entered text boxes.
362	System: General	The system shall allow the user an unlimited number of login attempts
363	System: General	The IFOTA shall be fully functional for one user only.
364	System: General	The IFOTA shall be fully functional for a team of users, each working on different modules.
365	Module: RFI	IFOTA shall provide a Request for Information (RFI) module.
366	System: General	IFOTA shall permit users to access multiple scenarios simultaneously
367	System: General	IFOTA shall display a summary of the justification text entered. May be the same screen it was entered in.
368	System: General	IFOTA shall display a summary of the deconfliction text entered. May be the same screen it was entered in.
369	System: General	IFOTA shall capture plan sequels
370	System: General	IFOTA shall use the FM 3-05.301 as a guide to developing the PSYOP planning module.
371	System: General	IFOTA shall provide a means to capture Target Audience Analysis planning (ref. FM 3-05.301)
372	System: General	IFOTA shall use the USAF Operational Military Deception Planners Handbook as a guide to developing the MD planning module.
373	Software: General	The IFOTA shall provide an example list of Air Force operational objectives organized by service supported
374	Functionality: Print	The IFOTA shall allow users to print MD, PSYOP, OPSEC and/or PA plan summaries contained within a scenario
375	Functionality: Print	The IFOTA shall allow users to print complete set of MD, PSYOP, OPSEC and/or PA supporting tasks (with associated decision criteria) contained within a scenario (complete IO discipline plan)

376	Functionality: Print	The IFOTA shall allow users to print MD, PSYOP, OPSEC and/or PA COAs (with associated decision criteria) for individual tactical tasks (portions of the IO discipline plan)
377	Functionality: Print	The IFOTA shall allow users to inputs to the Commander's Briefing
378	Functionality: Print	The IFOTA shall allow users to print the Commander's Briefing
379	Functionality: Print	The IFOTA shall allow users to print the target list
380	Functionality: Print	The IFOTA shall allow users to print the event schedule
381	Software: General	The IFOTA shall capture user-identified high priority targets
382	Software: General	The IFOTA shall capture user-identified high payoff targets
383	Software: General	The IFOTA shall capture user-identified common targets
384	Software: General	The IFOTA shall capture user-identified prioritization for the combined IO COA recommendations in the Commander's Briefing
385	Module: MD	The IFOTA shall capture user-generated probability of success estimates for MD supporting tasks
386	Module: PSYOP	The IFOTA shall capture user-generated probability of success estimates for PSYOP supporting tasks
387	Module: OPSEC	The IFOTA shall capture user-generated probability of success estimates for OPSEC supporting tasks
388	Module: PA	The IFOTA shall capture user-generated probability of success estimates for PA supporting tasks
389	Module: MD	The IFOTA shall capture user-generated rankings for MD supporting tasks
390	Module: PSYOP	The IFOTA shall capture user-generated rankings for PSYOP supporting tasks
391	Module: OPSEC	The IFOTA shall capture user-generated rankings for OPSEC supporting tasks
392	Module: PA	The IFOTA shall capture user-generated rankings for PA supporting tasks

393	Module: MD	The IFOTA shall capture user-identified MD supporting tasks and include in them in the Commander's Briefing
394	Module: PSYOP	The IFOTA shall capture user-identified PSYOP supporting tasks and include in them in the Commander's Briefing
395	Module: OPSEC	The IFOTA shall capture user-identified OPSEC supporting tasks and include in them in the Commander's Briefing
396	Module: PA	The IFOTA shall capture user-identified PA supporting tasks and include in them in the Commander's Briefing
397	Module: MD	The IFOTA shall capture user-identified justifications for MD supporting tasks in the Commander's Briefing
398	Module: PSYOP	The IFOTA shall capture user-identified justifications for PSYOP supporting tasks in the Commander's Briefing
399	Module: OPSEC	The IFOTA shall capture user-identified justifications for OPSEC supporting tasks in the Commander's Briefing
400	Module: PA	The IFOTA shall capture user-identified justifications for PA supporting tasks in the Commander's Briefing
401	Module: MD	The IFOTA shall capture user-provided cost/benefit assessment or other cost-based assessment or cost documentation for each MD supporting task
402	Module: PSYOP	The IFOTA shall capture user-provided cost/benefit assessment or other cost-based assessment or cost documentation for each PSYOP supporting task
403	Module: PA	The IFOTA shall capture user-provided cost/benefit assessment or other cost-based assessment or cost documentation for each PA supporting task
404	Module: MD	The IFOTA shall capture user-identified cost information for MD supporting tasks in the Commander's Briefing
405	Module: PSYOP	The IFOTA shall capture user-identified cost information for PSYOP supporting tasks in the Commander's Briefing
406	Module: OPSEC	The IFOTA shall capture user-identified cost information for OPSEC supporting tasks in the Commander's Briefing
407	Module: PA	The IFOTA shall capture user-identified cost information for PA supporting tasks in the Commander's Briefing
408	Module: MD	The IFOTA system shall capture user justification for MD support task and associated MOE/MOP recommendations
409	Module: MD	The IFOTA system shall capture user justification for MD story development

410	Module: MD	The IFOTA system shall capture user justification for MD story delivery means
411	Module: MD	The IFOTA system shall capture user justification for MD Event Schedule entries
412	Module: MD	The IFOTA system shall capture the user's target audience analysis
413	Module: MD	The IFOTA shall provide space for the user to insert measures of effectiveness (MOEs) for each MD supporting task (aka MD tactical supporting task)
414	Module: MD	The IFOTA shall provide example MD MOEs
415	Module: MD	The IFOTA shall allow the user to input MD means
416	Module: MD	The IFOTA shall allow the user to select multiple MD means
417	Module: PSYOP	The IFOTA shall link to PSYOP supporting references (simulating reachback and SIPRNET)
418	Module: PSYOP	The IFOTA system shall capture the user's PSYOP target audience analysis
419	Module: PSYOP	The IFOTA system shall capture the user's likelihood of change estimate
420	Module: PSYOP	The IFOTA system shall capture a description of the user-developed influence COA
421	Module: PSYOP	The IFOTA system shall capture the user's scheduling/timing recommendations
422	Module: PSYOP	The IFOTA system shall display the PSYOP schedule of events
423	Module: PSYOP	The IFOTA system shall capture operational feedback (simulated mission results)
424	Module: PSYOP	The IFOTA system shall display operational feedback
425	Module: PSYOP	The IFOTA system shall distinguish between MOE and MOP feedback
426	Module: PSYOP	The IFOTA system shall capture user justification for target action and MOE/MOP selection

427	Module: PSYOP	The IFOTA system shall capture user justification for selection of best changes to influence factors
428	Module: PSYOP	The IFOTA system shall capture user justification for influence COA development
429	Module: PSYOP	The IFOTA system shall capture user justification for delivery method and time inputs
430	Module: PA	The IFOTA system shall permit the user to capture MOEs for PA-specific tactical support tasks
431	Module: PA	The IFOTA system shall capture user justification for MOEs and MOPs
432	Module: PA	The IFOTA system shall capture the PA desired target opinion
433	Module: PA	The IFOTA system shall capture the PA "worst case scenario" assessment and associated requirements
434	Module: PA	The IFOTA system shall capture the user's PA target audience analysis
435	Module: PA	The IFOTA system shall capture operational feedback (simulated mission results)
436	Module: PA	The IFOTA system shall display operational feedback
437	Module: PA	The IFOTA system shall distinguish between MOE and MOP feedback
438	Module: OPSEC	The IFOTA system shall capture the OPSEC target audience analysis
439	Module: OPSEC	The IFOTA system shall capture operational feedback (simulated mission results)
440	Module: OPSEC	The IFOTA system shall display operational feedback
441	Module: OPSEC	The IFOTA system shall distinguish between MOE and MOP feedback
442	Module: OPSEC	The IFOTA system shall capture user justification for MOEs and MOPs
443	Module: OPSEC	The IFOTA system shall capture impact in the range of 1-100.

APPENDIX B
USE CASES & UML DOCUMENTATION

Figures B-1 through B-4 illustrate UML modeling for IFOTA.

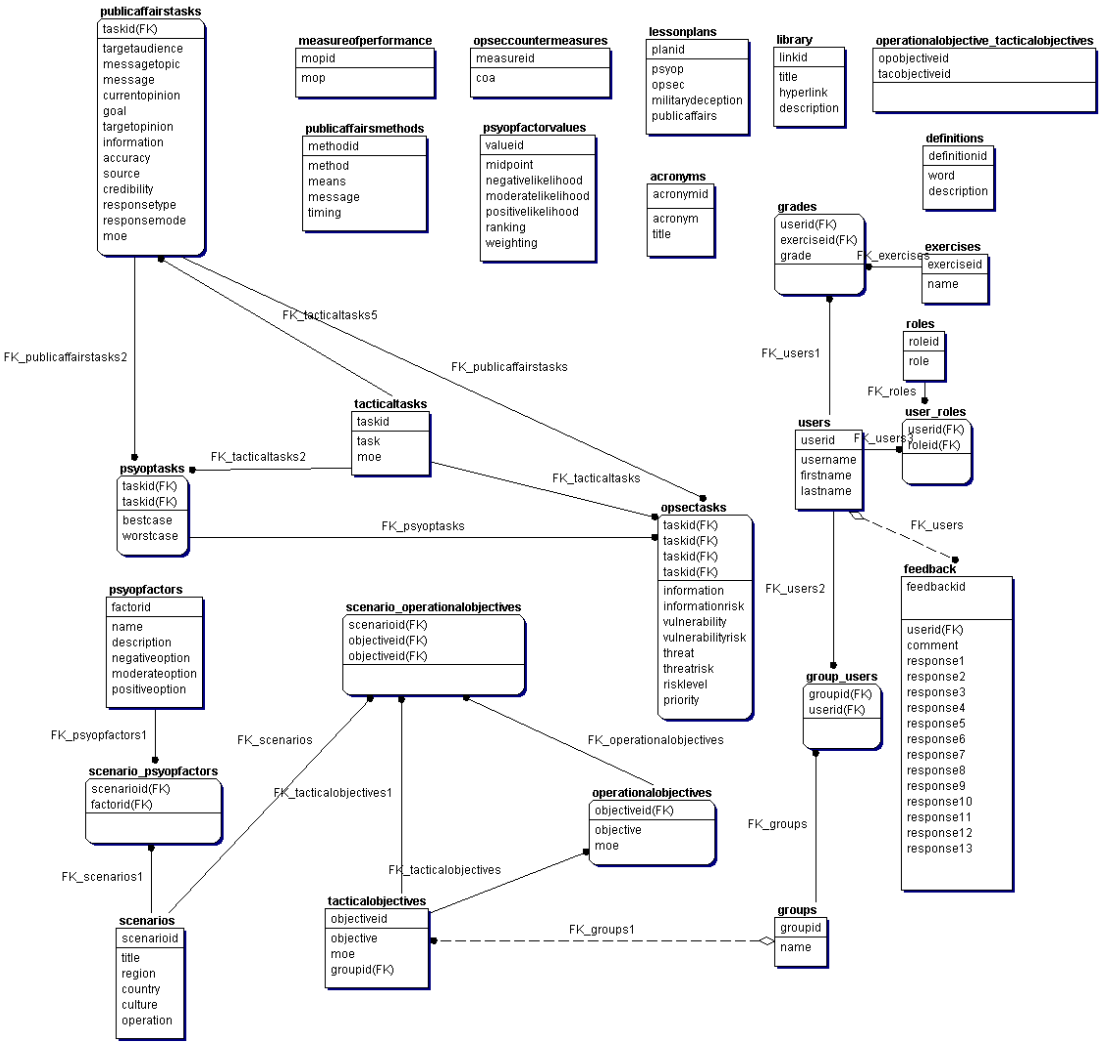

Figure B - 1. Truncated Entity-Relationship Diagram (based on Version 2)

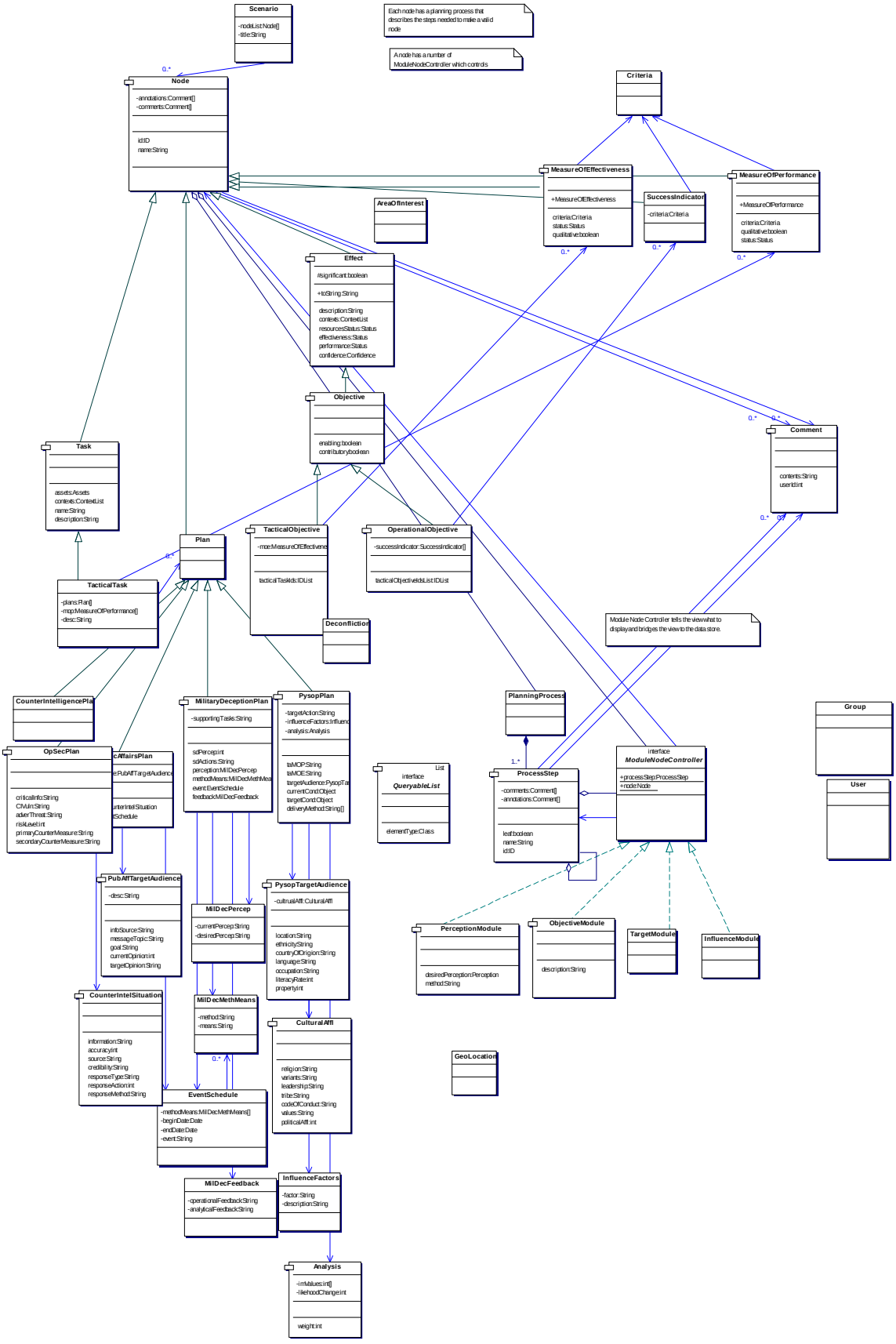

Figure B - 2. General Class Diagram of Main Planning Elements (based on Version 2)

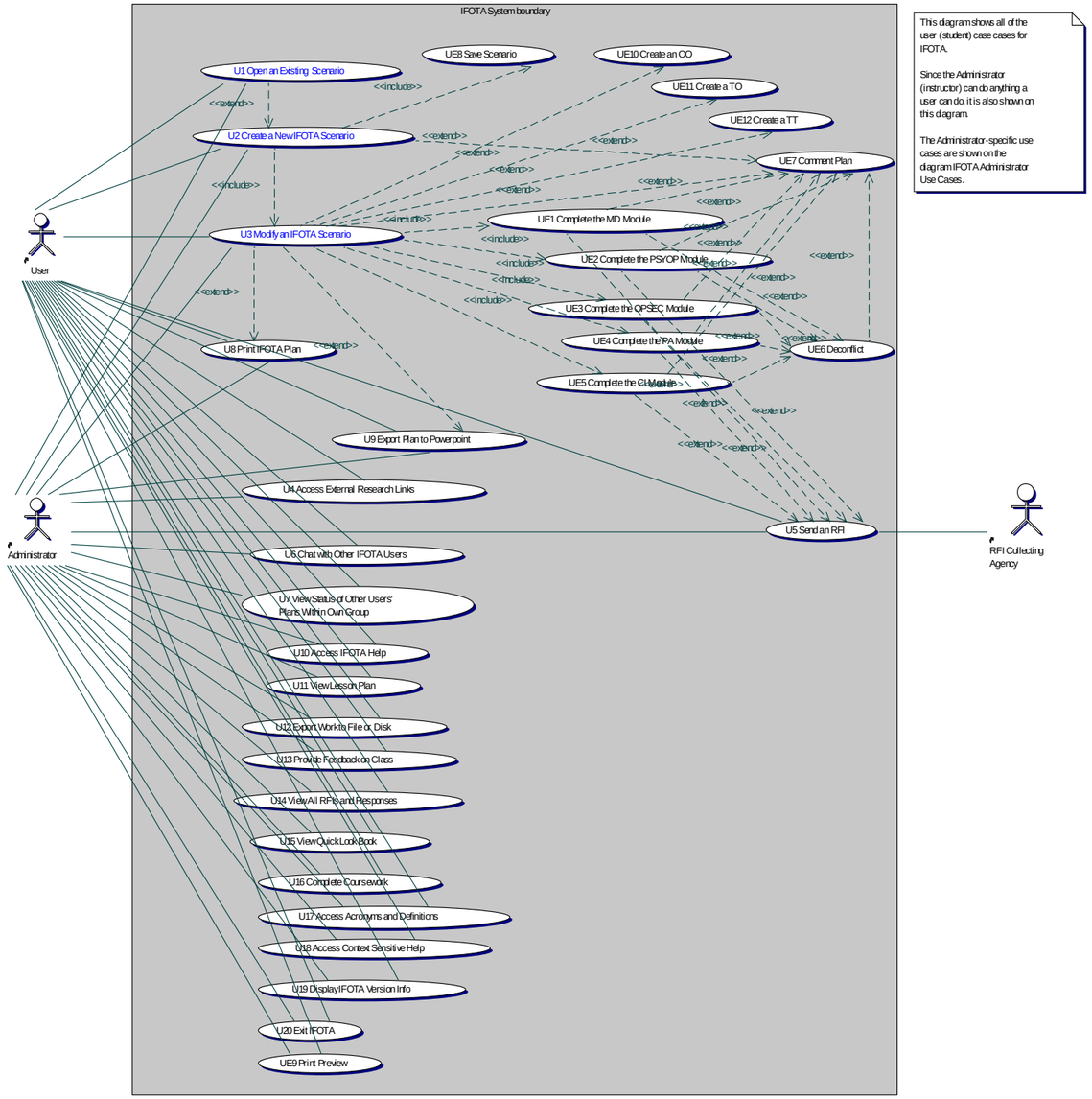

Figure B - 3. Use Case Diagram (based on Version 2)

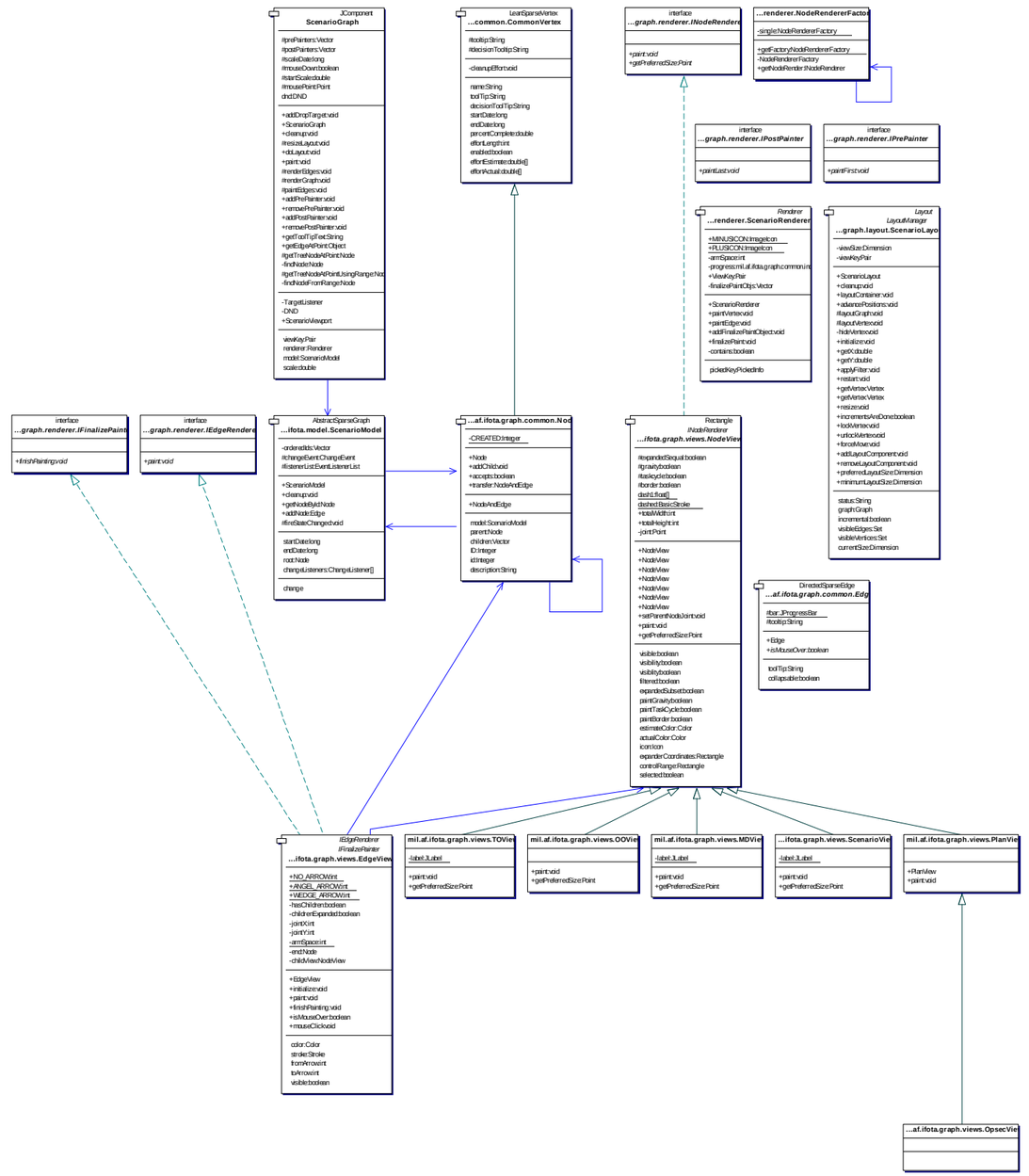

Figure B - 4. View Model Class Diagram (based on Version 2 - Jung)

APPENDIX C
TRIP REPORTS

MEMORANDUM FOR RECORD

SUBJECT: IWE DO-0008 Trip to Hurlburt Field, FL (39th IOS Schoolhouse)

FROM: Elisabeth Fitzhugh, Human Factors Lead, SRA International

1. Introduction. Notes below are captured in terms of utility and usability issues and requirements identified during the trip.

IOTA, a Psychological Operations (PSYOP)-oriented planning tool, is intended to be an influence operations training aid that walks analysts through the PSYOP planning process and prompts analysts to evaluate potential courses of action. It uses standardized military objectives based on tenets of air and space employment. COA evaluations are based on 1) subjective weights and ranks assigned to critical cultural factors associated with the target audience (TA) that impact achieving the desired effect and 2) the anticipated probability of modifying those factors to induce the desired effect. The evaluation is a risk assessment for the projected course of action (COA).

The current version was developed for operational use. Future plans call for updating the PYSOP component and integrating Military Deception (MD), Public Affairs (PA), and Operations Security (OPSEC) planning components using the same or similar algorithms to assess COAs.

The trainers' goal is for the system to support student acquisition of an integrated multidisciplinary perspective capability as well as specific AOC targeting and planning capabilities. IOTA should support students as they learn to organize a body of knowledge, plan and execute a strategy across all influence operations disciplines.

AF Influence Operations (IO) are based on exploitation of the adversary's mental state. The choice between media-based and leaflet-based campaigns or other non-kinetic methods are choices between delivery mechanisms. In determining methods, students must bear in mind where information comes from and its probable validity, maintain an appropriate cultural mindset, understand the "why" behind the information, and form appropriate mental models. They must be able to weight TA fears, understand how those fears influence behavior, and understand the "why" behind behavior.

2. Usability Issues (Focus on the User)

User Characteristics

2. Class Demographics:
    a. Joint class members are integrated by service and rank (range from E-2, E3 to Lt Col). Members exhibit differential levels of expertise; levels of expertise range from 2 to 3 years (beginner) to 15 years (expert).

    Issue: Class tools need to be scalable to teach and test multiple levels of expertise.

    b. There are one to two instructors per ~20-person Influence Operations (IO) class. The class focuses on Falconer Aerospace Operations Centers

(AOCs). Class population comes from the nine Information Warfare Flights (IWFs) Class constitution is governed by the gaining unit and their needs. Percentages change from class to class.

Issue: Student need for instructor attention will vary. Class tools need to be self-supporting to some degree to allow students to work independently.

c. Students are taught how to support all IO disciplines used in AOC but when they report to their IWFs, they will fill whatever slots are open, performing IPB for deliberate planning and continuous update functions. During contingencies, approximately ½ the flight will go with the AOC; the rest will remain with the IWF, supplying reachback.

Issue: There is a concern that students may forget lessons that aren't reinforced over time.

3. Student Computer Expertise:
   a. The tool is HTML-based and will be accessed as a web page. The web page interface is desirable as all students should have familiarity with a web environment; students are expected to know how to use typical internet browser functions.

   Issue: The tool needs to incorporate all the capabilities of a web environment (*highlight, copy, paste, save as*). Aids should include pop ups, hover, find, and drill down capabilities. Users should be able to jump to mail to output to other organizations.

   b. Student briefings, which simulate presentations to AOC decision makers, are done in PowerPoint (however, trainers express a desire for the system to integrate with all MS Office).

   Issue: The tool currently supports *copy* and *paste* functions, but automating transfer of information from the tool to the PowerPoint presentation would save time and effort. Trainers want the program to integrate with Microsoft Office and be able to "push" to TBMCS.

Task Characteristics

2. Task Overview:
   a. Tasks are constrained by class time. In the first part of the course, trainers give an overview of the different disciplines, the standard measures of behavior, and how to measure behavior. In the second phase, SMEs give units of instruction on their specific disciplines, use slides accompanied by slide notes. The course moves from rote memory exercises to demonstrations of subject matter expertise.

   Issue: Currently, students get three weeks of practice in the planning stage. Eventually, trainers will integrate practice exercises into more of the course. Instructors and students will create new scenarios to add to IOTA's existing scenario database. As more information is acquired, there will be a need to update the influence operations factors to reflect increased understanding.

   b. Using the tool prototype, for a given scenario, students should be able to identify operational and tactical objectives and associated measures of effectiveness (MOEs), characterize the target audience and identify opportunities, limiting factors (LIMFACs) and susceptibilities, and rank

and weight the susceptibilities. The students should be able to give a level of confidence in information and a level of effectiveness (ability to reach the susceptibility); the student should be able to weight the likelihood of success.

Issue: Students will have access to Secure Internet Protocol Router Network (SIPRNET), Non-Secure Internet Protocol Router Network (NIPRNET), and the Joint Worldwide Intelligence Communications System (JWICS). The user must be able integrate database access and exercise activities. The students use IWPC, IWS, and ION; some degree of IOTA integration may be required.

c. To complete the task, students should be able to use available databases to research culture and leadership aspects to determine how to affect the population and the leadership.

Issue: Navigation between planning and decision support tools and supporting databases should require minimal effort and minimal time. No picture of what the screen will look like while the student moves between application and reachback capabilities is currently articulated. How the system looks, how the students will keep track of where they are between applications, how quickly and easily they can navigate and how quickly and easily the database supports their information quests are all human factors integration issues.

GUI Environment

2. Common Look and Feel:
   b. The IOTA tool, like some other applications students will use, is web-based. Other applications are MS Office-based or employ the standard Windows work environment.

   Issue: The IOTA tool GUI should leverage student familiarity with the MS Internet Explorer web browser and Office suite GUIs. It should also leverage all Windows "Help" capabilities and user aids (Help topics, Table of Contents, Index, Glossary, context-sensitive Help, etc.)

Operational Environment

2. Environmental Characteristics:
   b. Students will be working as teams to create their recommendations. Students will represent the different disciplines/roles found in the AOC.

   Issue: Students need to be able to work alone or collaboratively. Students need to be able to deconflict their respective plans.

3. Utility Issues (Focus on the Task)

Job Requirements

2. Mission-level Expectations:
   a. Students will be taking the role of AOC staff and will have to consider how their input factors into the overall mission plan

   Issue: None currently identified

b. Expectations are that students will push to have the training tool made operational.

Issue: The more realistic the training tool is, the more likely students are to push for it; a very realistic training tool will be easier to operationalize.

c. The students must integrate and deconflict their recommendations with other IO disciplines

Issue: A vision of how the deconfliction aspect will work has not yet been articulated.

Trainer Tool Use

4. Tracking:
   a. Trainers have not yet considered all they want the tool to track. They exhibited a positive response to the suggestion that the tool might include a mechanism for tracking exercise and test performance. System tracking would lighten the trainer workload.

   Issue: Any tracking expectations should be worked out now to aid the designers' planning process. Trainers indicate they will be giving individual grades and group grades for group efforts. How to track that should be thought out in advance as well.

5. Testing:
   a. Trainers expect to use the tool in both in class exercises (partial tasks) and the capstone exercise that will permit students to integrate all they have learned in the course.

   Issue: Trainers indicated a desire to be able to see what students were doing in order to supervise and aid.

   b. Trainers want to integrate students' capabilities in team exercises and stretch everyone. They want to elicit thinking through student identification of options and variables. Trainers suggest that the tool include an option that allows them to increase exercise difficulty based on student performance ("teach to each" versus "teach to mean"). An example is the ability to go from a two-channel "on/off" scenario to a five-channel one, increasing the number of options in the variables offered. They also suggest adding an assessment method to tell what would have happened if the student had chosen differently, following the branches, and a method to anticipate sequels.

   Issue: Currently there is no scalability in the training module. Specific requirements for extension modules are yet to be determined.

6. Feedback:
   a. Subjective weightings/rankings are only as good as the student's expertise and information base. The exercise of decomposing the factors that affect the TA and watching how changing weights for individual factors changes the probability of success is valuable in itself. Trainers suggested that they would like to see feedback. They envisioned the following training scenario:

- For a given exercise, the system provides a series of variables that form three distinct paths to follow (Path A=50% of the solution, Path B=100%, and Path C=25%).
- System collects data on the students' selection of variables and how they justified them.
- System identifies the incorrect paths and the shows cascading effects from following the wrong route.
- System shows the correct path and its cascade of effects.
- Trainer tracks student progress; if at any point, the student chooses A, the trainer can show why that path is not optimal, but if the student chooses C, the trainer knows to take him/her back to basics.

Issue: Hardwiring, as described above, cuts down on options, but the trainers say that is all right for a training aid. Providing only this option would not necessarily provide a close match with reality, where there is often no right answer.

b. However, the system could also be designed to allow freedom of thought/movement, offering a best choice answer and several others that varied in degree of usefulness, and allowing the student to work out a best possible solution. In this mode, the system again would show possible outcomes.

Issue: Including both of these modes would allow the student to progress from canned classroom scenarios to real world scenarios. It would also provide a method for providing increased difficulty for more able students.

Student Tool Use

3. Student Task:
   a. The classes mirror every step of the planning process, taking the student from "hands-on" trainer-supported exercises to a "hands-off" capstone training effort. Trainers provide the students with a set of JTF objectives and plug in standardized objectives for the exercise, depending on the scenario (e.g., eight objectives for phase one). Influence operations objectives will be the sub-objectives (influence nation command, influence political structure, etc.) Each individual discipline can answer the need. Students learn to write their own objectives and how to modify Air Staff concepts to perception management needs and integrate counter-intelligence perspectives. Students must learn to support *why* a non-kinetic option is preferable to convince the AOC. They must be able to present their plan, provide appropriate details, make a strong argument, show the effects and the effects desirability, and defend the plan's solution.

Issue: IOTA must be updated to include the entire planning process; the designers intend for the tool to mirror the language used in AOC planning. As the AOC planning process is under development, language changes may have to

be updated/updatable. (MOEs should be included in the program, but need to be adjustable as analysis renders them inappropriate.)

b. In the new exercises, all targets go "on deck" no matter how they are to be prosecuted, only the restricted target list will be retained. Kinetic and non-kinetic options will be de-conflicted (e.g., will ensure that there is no close air support activity scheduled for the vicinity of leaflet drops). The point is to integrate the air picture for the day and deconflict all missions at once.

Issue: How the deconfliction aspect will be managed is not yet articulated.

c. Students will practice assuming different roles in the AOC. Hands-on exercises will be require both individual effort, with each student using different expertise to do his/her own portion, and group coordination, integrating and deconflicting individual efforts. Lesson includes teaching students how to present to staff estimates of non-kinetic actions. In order to accomplish the task, students also must learn how to manage group dynamics.

Issue: How the students will collaborate is not yet articulated.

4. Task Support:
   a. Classification: At IOIC, students will stay on JWICS, with SIPRNET and NIPRNET for research and reach-back capabilities. MD will be done at the SECRET/NOFORN level, and will incorporate national level entities on JWICS. Exercises may require going to a high level classification.

Issue: Unclassified paradigms for scenarios will need to be built; there will be nothing classified in the developmental design. For the MD section, the design will need to separate high and low classification aspects (multi-level security?).

b. MD, OPSEC and PSYOP employ somewhat different terminologies to reflect their different perspectives. OPSEC is the only track that asks the student to look at how their plan will both impact US activities (giving Indications and Warnings; I&W) and US perceptions.

Issue: Language usage will have to be carefully documented and managed. Additionally, the OPSEC track may pose difficulties for students as they have to focus their objectives differently than in PSYOP and MD. The OPSEC objective is to remove I&W, whereas the MD objective is to exploit them.

c. How well the students know where to get data will vary by student; students are given lists of urls in class that the instructors have compiled.

Issue: The instructor-supplied urls can be integrated into the internet browser as favorites and the file emailed for importation in the students' home systems.

d. Students must factor in cultural analysis issues (e.g., how to communicate with non-literate populations). Students are taught to leverage preconceived adversarial and military mindsets.

Issue: PYSOP recommendations are turned over to the Army for implementation. The actual method of implementation is not determined by the student.

e. In the current version of the tool, the focus is on the factors that influence TA behavior, the estimated difficulty friendly forces will experience directing TA behavior toward the goal state.

Issue: The goal state is represented by standard PSYOP objectives; the actual PSYOP plan is not captured when users project probability of success influencing TA behavior.

f. PSYOP doctrine is in a state of flux. The new JP 2.5.3 draft hasn't been signed yet; neither has the new OPSEC draft.

Issue: The changes in doctrine will probably impact lesson plans and decision support tool requirements. Additionally, according to the trainers, current AF training focuses on deliberate and contingency planning for force execution missions. Training doesn't cover how to plan for Humanitarian Assistance (HA), Noncombatant Evacuation Operations (NEO), and Civil Affairs (CA) outside of hotspots in the Middle East. Training doesn't cover planning for nation building or planning for handing over an area to the ambassador for reconstruction. Training doesn't cover how to redeploy, reconstitute or employ forces in interim periods and how to get people in and out safely. PSYOP is concerned with developing ways to endear US forces to the population to reduce risk and increase cooperation. Any future effort to add in these training modules will extend required scenarios considerably.

4. System Requirements

1. Modify current version to show military objectives at three levels:
   - Operational air objectives
   - Tactical objectives
   - Tactical tasks
2. Modify current version to include success indicators (measures of merit) at each level of objective.
3. Modify current version to allow the operator to modify operational objectives, sub-objectives and success indicators.
4. Update current version to reflect new PSYOP-related behavioral information.
5. Modify current version to reflect language used in course/work area.
6. Integrate the work domain language of all SME tracks into the tool.
7. Develop a glossary for planning language.
8. Develop interoperability with Sensor Harvest, IWPC, IWS, ION
9. Redesign current tool to take the trainee from planning to outbrief. Modify the current tool to export the objectives, measures of merit, suggested COAs (in rank order), COA risk assessment/rationales, and anticipated end states to a PowerPoint slide show suitable for briefing decision makers.
10. Include a capability to track student progress, give feedback, show alternative paths and outcomes, and capture student performance.
11. Include a capability to show branches and sequels for planning over time.
12. Include a capability to update scenarios based on target audience response.
13. Integrate the tool with MD (uses MIDB) and OPSEC data sources and planning tools. (Currently, PA has only been discussed as an adjunct to each of the other

disciplines.) Integration should include deconfliction of PSYOP, MD and OPSEC COAs.

14. Integrate the tool with Secure Internet Protocol Router Network (SIPRNET), Non-Secure Internet Protocol Router Network (NIPRNET), and the Joint Worldwide Intelligence Communications System (JWICS)
15. Develop ability to capture information in different databases and integrate access to database system. In PSYOP and MD, need to be able to populate the databases with new information as it is learned.

5. Collection/Testing Suggestions

1. Need to perform cognitive walk-throughs with several trainers (optimally, with students, too) to observe and analyze tool use behaviors.
2. Need to perform experiments to differentiate between "aided" versus "unaided" performance. Need to collect baseline performance data.
3. Need to perform usability tests (includes collection of error behaviors, system response to errors, hesitations, system aid needs, performance times, etc.)

6. MD & OPSEC

- The MD and OPSEC processes model the basic IO process; some terminology differences were noted and will have to be incorporated in design planning.
- IO (especially in MD) identifies the primary decision maker and leverages his/her perceptions to US advantage. Whenever possible, it seeks the path of least resistance, using adversary opinion rather than changing it.
- MD's twin goals are to increase adversary ambiguity to slow correct decision making, and conversely, to decrease adversary ambiguity to speed incorrect decision making. OPSEC goals are to maximize our information protection and minimize our information leaks. In contrast, MD leverages information leaks.
- Trainers indicate MD and OPSEC options can be broken out as variables and weighted as is done for PSYOP in IOTA. The trainers anticipate the IOTA algorithms will work with minimal adjustment. The OPSEC focus is internal. It includes internally-directed vulnerability assessment and situational risk assessment elements that must be factored into its track design.
- MD and OPSEC use PA extensively and ideally are never isolated from PA planning. However, no PA representative was available to discuss PA track requirements.
- Although the major emphasis was on deconfliction of different tracks; trainers also mentioned cooperative efforts across tracks. In the future, cooperative planning capabilities may have to be added to IOTA.
- MD and OPSEC requirements were in synchrony with PSYOP requirements. With the exception of PSYOP-specific comments, system requirements can be assumed to apply to MD and OPSEC tracks.

MEMORANDUM FOR RECORD

SUBJECT: IWE DO-0008 Trip to Hurlburt Field, FL (39th IOS Schoolhouse)

FROM: Mike Zywien, Project Lead, SRA International

3. Notes below are captured in terms of the "usability" and "usefulness" criteria SRA is developing for the IOTA project.

4. Usefulness Criteria (How effective and flexible is IOTA in supporting the work of the IO instructor and student?):

a. Effectiveness
    i. Support IO planning for all phases of an OPLAN
    ii. Ensure Objectives get entered in correct terminology and structure and can have associated success indicators and measures of merit inserted
    iii. Account for uniqueness of each track (e.g. MD process and target distinctions from PSYOP process/targets, OPSEC process/targets)
    iv. Take advantage of synergies among tracks
    v. Account for risk as well as probability of success in presentation of output
    vi. Ensure each module (PA, MD, PSYOP, OPSEC) reflects the process for that track (not all processes are the same)
    vii. Does IOTA ontology/taxonomy mirror the language of the course materials and the relevant discipline
    viii. Does IOTA reinforce the instructors presentation of the course work
        1. IOTA presentation mirrors IO planning process taught in lessons
        2. IOTA provides cues/prompts when reachback is required
        3. Import methodology and format for reachback simulates process taught in lessons
    ix. Does IOTA reinforce student understanding of the course work
        1. IOTA presentation is familiar to student and mirrors process taught in lessons
        2. Understanding of when reachback is needed is clear and straightforward
        3. Easy cues/prompts to access needed data sources (reachback)
        4. Student can import reachback data as required
        5. Interoperability with other applications – student can provide model output in required presentation formats
    x. Scaleability
        1. IOTA can be used for beginning and challenged students and advanced students can take advantage of features to push the analysis envelope and bring in more expertise and sophistication

2. Ability to control versions, configuration of tool and data

xi. Collaboration
   1. Input and results be exchanged, shared
   2. Framework to support collaboration
   3. Internal (within schoolhouse) and external (reachback) collaboration
   4. Ensure ability to integrate IO track (MD, PA, PSYOP, OPSEC) plans (build supporting objectives and target assessments)
   5. Ensure ability to de-conflict IO track plans (flag objectives and analyses that will negatively impact plans for other IO tracks)
   6. Output directly supports presentation of an integrated, de-conflicted IO plan for a given scenario, mission objective

xii. Extensibility
   1. Students can use this tool when they report to their assigned units
   2. IOTA can be implemented in IWPC or Sensor Harvest as a tool to support deliberate and crisis action IO operational planning
   3. Compatibility/extensibility to ION (joint community)

xiii. Tracking
   1. A way to capture student thought process for each input to the model (error traceability, rationale, justification, support for end recommendations and outbrief) – notes pages
   2. R/Y/G student grading at completion of model runs with appropriate feedback and indications of where errors were made, improvements could be made
   3. Guided discovery

b. Flexibility
   i. Easy to update and expand to advanced versions, new modules, refined modules
   ii. Ability to access pre-canned objectives, modify pre-set objectives, add new objectives

5. Usability Criteria (how easy is this tool to use)
   a. Implementation on JWICS (access SIPRNET, NIPRNET source data)
   b. Event and change detection
   c. Representation aiding
      i. Graphical display of "what if" and impact analysis
      ii. Progress bar to indicate what steps have been successfully accomplished
      iii. Buttons to move among track modules (PA, PSYOP, MD, OPSEC)
      iv. Glossary
   d. Error detection and recovery
      i. Help functions – how useful, how comprehensive, how clear and easy to use
      ii. Indicators of invalid input (e.g. weights) – "need to re-evaluate"
      iii. Indicators of output that does not make sense

e. Make coherent, relevant information out of data
    i. Map IOTA output to what's needed for target planning presentation (e.g. targeting sheet)
f. Predictive capabilities
    i. "What-if" analysis
    ii. Sensitivity analysis
    iii. Impact analysis
g. Interoperability
    i. Search engine integration (reachback)
    ii. Pointers, aids to access existing data sources
        1. Databases (various organizations)
        2. Web sites (instructor bookmarks)
        3. Documents
        4. Media
        5. SMEs
    iii. "Send to" button for checking, collaboration

6. Other general observations:
    a. IOS focus is on INTEGRATED IO Planning at Operational and Tactical levels in support of JFC, JFACC campaign objectives
    b. Schoolhouse sends students to all 9 IWFs (USAFE, CENTAF, Davis-Monthan, PACAF, USFK, AFSPACE, Weapons School, TRANSCOM, and NORTHCOM)
    c. IOTA can support both instruction and testing
    d. Output probabilities may help student adjust measures of merit and Objectives
    e. MD and OPSEC processes are different from PSYOP process, however all students will be trained as planners, and all are interested in target vulnerabilities and capabilities (targets will be somewhat different for each track)
    f. Reachback is very important and needs to be integrated into the IOTA
    g. Sensor Harvest data will be very useful as a reachback capability for IOTA
    h. IWPC is being considered as the "future Joint planning suite." VPT lessons learned may aid IOTA integration into IWPC environment
    i. OPSEC risk assessment methodology may be useful for other tracks, too
    j. OPSEC track can have great potential for conflict with other tracks in that other tracks (PA, MD, PSYOP) are interested in exploiting our indicators, whereas OPSEC is interested in removing indicators

7. Plan is to target an interim demonstration of the revised IOTA in the November 2004 timeframe. This was an extremely valuable collection trip. Team will document observations, share them with other participants and the trainers, and use as a basis to begin design phase of project.

MICHAEL L. ZYWIEN
SRA Project Lead

MEMORANDUM FOR RECORD

SUBJECT: IWE DO-0008 Trip to Hurlburt Field, FL (39th IOS Schoolhouse)

FROM: Pat Ryan, Consultant, SRA International

1. Notes appearing after this page were captured during interviews with Subject Matter Experts and System Administration personnel.

PATRICK H. RYAN
SRA Project Consultant

Notes by Topic

May 12-13, 2004

Topic/Role	Who	Comments
IOTA		
	Metrica	(Gave PPT presentation on IOTA)
	Metrica	Intends to create a paradigm that can be copied and customized to a specific scenario.
	Metrica	want to be able to create a scenario for any country. (country map (image map?) needs to define region for each
	Metrica	SMART model accounts for variability in confidence levels
	Metrica	IOTA is written in C++
	Metrica	Database is current Access. Future version will be SQL Server
	System Admin (SA 3C)	Info Workspace (IWS) requires Oracle server. They may be installing IWS soon, and if so, they will stand up an Oracle server.
	System Admin (SA 3C)	They run Windows2000 on clients, Windows 2000 Server on servers. Moving everything to Gigabit Ethernet. Clients are Dell slim profile PCs, servers are Compaq Proliant. They've got huge budget for equipment so they get pretty much anything they want. Micro
	Admin (SA 3C)	Leah talked to me about their in-house configuration. They want to document it in accordance with STEMB (SA civilians that do CM for all AF bases), but simply don't have time because they are expanding so fast. They use KVM switches on all their Dell PC c
	System Admin (SA 3C)	Currently have 7 servers dedicated to single functions: Print Server, File server, media server, Veritas backup server, web server (Jmeasle, Cold Fusion)
	System Admin (SA 3C)	Would like IOTA to have a nice setup.exe that presents a wizard which allows them to choose install directory, drives, etc. Central installation would be best (server side vs. client side). Their servers located underneath classroom seating (amphitheatre

Topic/Role	*Who*	*Comments*
	System Admin (SA 3C)	They have 5 networks: NSA (going away soon), SIPRNET, NIPRNET, JWICS (most robust, where they see IOTA installed on)
	System Admin (SA 3C)	Classes typically 25-60 people at a time. Can 60 use the tool at the same time? Multiple classes at the same time? IE is the std browser. Prefer not Netscape. Microsoft is implied std within IO School. Training 3C's on how to administer IOTA. IIS is their
	System Admin (SA 3C)	Jmeasle simulates an AOC
	PSYOP Instructor	The Rendon Group is the subscriptions database that is used by IO Planners.
	PSYOP Instructor	Tool should mirror every step of planning process
	PSYOP Instructor	Provide models as a zip file on a web site so it can be grabbed before deploying. NASIC does this for one of their other tools. Plenty of feedback when updating files (show what is new, allow to choose what is updated, etc.).
	PSYOP Instructor	Col. Durham (sp?) of PA center of excellence (Maxwell AFB) could use data from IOTA for their purpose.
	PSYOP Instructor	Wants to be able to "hand-jam" data into IOTA. (via notepad, excel, etc.) Quick and easy way to get data in
	PSYOP Instructor	Would like to be able to disable options via a tool. (For example, vulnerabilities). Selectively hide some of the intel data to make the task more difficult.
	PSYOP Instructor	Capture experts knowledge. NASIC needs to analyze where they collect info from and why the info states what it does. How to pull data from disparate db's into IOTA? PSYOPS="mental state". How do I get to his "melon". What do I do to his "melon". Do2= AFI2
	PSYOP Instructor	For novices (aka "rocks"), the scenarios would get progressively easier. For experts, it would get progressively harder.
	PSYOP Instructor	Export to IWPC is the number 1 destination for output of IOTA. Excel is backup plan. Powerpoint would also be good for briefing JFACC.
	PSYOP Instructor	Individual grading system required (vice team based) because entire team won't deploy together to same area.

Topic/Role	*Who*	*Comments*
	PSYOP Instructor	PSYOP Instructor talked again about capturing and sharing IOTA data with other IOTA users.
	PSYOP Instructor	Would like to see wildcard capability in keyword searches
	PSYOP Instructor	Need to add MOEs MOPS to the tool.
	PSYOP Instructor	Wants to edit, add, delete nodes in tool (Objective, Task, MOE, etc.)
	PSYOP Instructor	Need to justify the final plan coming out of IOTA: Answer the question: "How did I get here?"
Note		
	SRA	Looks like they might benefit by using Microsoft's TreeView in the left pane. Might simplify things a bit.
	SRA	IOTA Data Collection. Hurlburt AFB, Ft Walton Beach. Information Operations School. Staff Sgt. Spike Szeredy, Mike Zywien, Elisabeth Fitzhugh, Pat Ryan, Rosie Vasquez (Metrica), Dr. Brice Stone (Metrica), Capt. Tim Gameros (AFRL-HE WPAFB), Major Janelle Viera
	SRA	All classrooms have 2 plasma display hung in the back of the room so the instructor can see what is being displayed as well. 1 classroom has about 100 small cubicles with low walls so students can see the instructor, but get privacy between themselves.
		SRA "Show best changes" link in right pane shows top 3 to impact objective. What if it is determined that #2 is not feasible given the assets available. Can we see option #4? (Provide checkboxes?)
	SRA	Is there an editor for adding, modifying, deleting pre-set cultural/situational factors that show under each objective? (This came up early on in SKOPE development)
	SRA	Required fields not obvious until button pressed and message window pops up indicating which field was missed.
	SRA	Collection and dissemination of data. Taxonomy development. Finite/well defined scales for assigning values such as weightings, etc. RFIs for DB data?

Topic/Role	*Who*	*Comments*
SME		
	PSYOP Instructor	New curriculum being developed. Feels IOTA will fit in well.
	PSYOP Instructor	Students come up with COAs
	PSYOP Instructor	PM=Propaganda management
	PSYOP Instructor	SIPRNET and NIPRNET used for research. JWICS will be used for IOTA.
	PSYOP Instructor	The justification column (in Excel) contains why, what other targets are required in conjunction with this one
	PSYOP Instructor	JTF objectives given to students
	PSYOP Instructor	All objectives should be broad enough to allow any of the disciplines to be worked.
	PSYOP Instructor	Complexity levels of scenarios. As students get better, scenarios should get more complex, answers become more ambiguous, giving student more flexibility in analysis (not hard wired)
	PSYOP Instructor	Primary and secondary objectives provided to students.
	PSYOP Instructor	Students are taught to justify PSYOP target recommendations
	PSYOP Instructor	PSYOP Instructor currently selects zip files representing scenarios and expands them to set up for a class
	PSYOP Instructor	IOS class course content: Part1: Objectives, samples of behavior. Part2: Details of Objectives.
	PSYOP Instructor	Air Force has a 1 page doc which describes competence levels for students (2B, 3C, etc. where D=Expert). PSYOP Instructor will send out in package. We (SRA and Metrica) will tell AFRL what docs we want and they will request them from
	PSYOP Instructor	Data Weighting: SIGINT report or debrief often gives weighted value. Credibility rating given to data entered by a particular type of person. Short experience = lower confidence. Longer experience = higher confidence.
	PSYOP Instructor	Terminal Velocity Exercise: All targets will be put on the

Topic/Role	*Who*	*Comments*
		target list. (including PSYOP). That way, leaflet drop won't be undermined by a bombing.
	PSYOP Instructor	During assessment: best guess applies. In school environment, a right, wrong and almost right answers are available to choose from.
	PSYOP Instructor	Also need discipline specific objectives (CI, PM, etc.)
	PSYOP Instructor	PSYOP Instructor presented the IWPC PowerPoint presentation.
	PSYOP Instructor	IOTA data should be made available from a web site the way that Sensor Harvest data is, so that data can be
	PSYOP Instructor	Media Mapping Tool=world wide list of subscriptions (magazines, newspapers, etc.)
	PSYOP Instructor	We teach (????), crisis planning, force execution
	PSYOP Instructor	Phase 4 and 5 of a war (aka post-war Iraq) need heavy Information Ops planning
	PSYOP Instructor	IOS produces students destined for the AOC
	PSYOP Instructor	Guidance and Objectives from JFC remain largely unchanged through JFACC guidance and objectives.
	PSYOP Instructor	Powerpoint presentation briefly describes IW Vis, Tel Scope, Esync Matrix, ACE _Team Management - manage documents, query them.
	PSYOP Instructor	Targeting and Guidance Interface Facility (TGIF) interfaces IWPC to TBMCS
	PSYOP Instructor	IWPC 4.0 lecture brief should be ready soon. (Weeks?) We can request it in our package request (via AFRL)
	PSYOP Instructor	IWPC 4.0 going to Operational Task, Tactical Task, etc. See PSYOP Instructor's handout
	PSYOP Instructor	Priority of targets (GAT) is based on commonality. If the Navy and the Army also want the target struck, it is raised in priority on the nomination list. Geo location, assets available to conduct the attack are also considered.
	PSYOP Instructor	IWPC will be a joint tool
	PSYOP Instructor	Confusion was shared about entering the 2nd objective. It was not clear if it was going to be a sub-objective or what. This later turned out to be mostly terminology issue, which PSYOP Instructor later resolved for us. Metrica to change. We should put screen labels

Topic/Role	*Who*	*Comments*
	PSYOP Instructor	During the GAT meeting (Guidance and Targeting) a PowerPoint slideshow of maps showing the targets in different colors representing target type (naval, SAM, etc.) is used
	PSYOP Instructor	DIA target intel is imported into the MIDB, where it is used by IO Planners using IWPC or Excel, and then it is imported into TBMCS
	PSYOP Instructor	When viewing the target deck in TBMCS, they found that many targets are marked as inactive, simply because they don't have recent intel on them. But this doesn't mean they aren't a target anymore (absence of evidence is not evidence of absence). They get
	PSYOP Instructor	For moving targets, BE# of facility they are based out of is used. Notes section used to reflect actual current latitude and longitude
	PSYOP Instructor	Code words are used in the target deck to relate to classified targets behind the green door.
	PSYOP Instructor	IO Planners spend 50% of their time in the STO (green door), and 505 outside
	PSYOP Instructor	PSYOP Instructor talked about an AF std worksheet for defining objective-task-moe-mop, etc. Said he would send it to us. (I gave him my business card, but it might come in the package we request via AFRL).
	PSYOP Instructor	IWST is now called IWT (??)
SME MD		
	MD Instructor	"Spin Control" = PA term for SNOWBALL effect.
	MD Instructor	"Consequence Management" = MD term for SNOWBALL effect.
	MD Instructors (2)	Human Factors database at NASIC is another tool used
	MD Instructors (2)	Six stages of MD? (Situation=Military situation you're involved in, and what the desired situation is; Objective=Military and deception objective; Perception=Current enemy perception, desired enemy perception; Story=?; means=?, Moe, Mom Mop are the
	MD Instructors (2)	Approx 70 core IO planners were involved in Desert Storm
	MD Instructors (2)	Deception has a snowball effect (just like EBO does)

Topic/Role	*Who*	*Comments*
	MD Instructors (2)	Army deception constrained to their area (5KM x 5KM area for example). The point is that they don't look at the big picture and how everything is related.
	MD Instructors (2)	Joint Universal Lessons Learned database is a tool that is used
	MD Instructors (2)	When students leave, they will know how to Plan and interact with other Influence Operations
	MD Instructors (2)	We use reachback to MAJCOMS for advice, help.
SME OPSEC		
	OPSEC Instructor	OPSEC plays in every objective
	OPSEC Instructor	3 Questions to ask: Can enemy collect on indicators that I've put out there?; Can he analyze it?; Can he act on it?; If he can, then what is the impact?
	OPSEC Instructor	MD enjoys indicators, OPSEC wants to get rid of them
	OPSEC Instructor	OPSEC Product is OPSEC Annex
	OPSEC Instructor	Only tool in use is the OPSEC Survey Tool
	OPSEC Instructor	OPSEC course teaches JOPES, Crisis Action Planning
	OPSEC Instructor	5 step process
	OPSEC Instructor	OPSEC guys ensure PA and MD are not revealing anything sensitive.
	OPSEC Instructor	OPSEC monitors our vulnerabilities (not enemy's)

APPENDIX D
BIBLIOGRAPHY

The following bibliography lists primary source materials for IFOTA development. Other sources were also reviewed, including several versions of curricula for the IOIC course. Supplementary and detailed information was obtained from SME interviews.

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APPENDIX E

ACRONYM LIST

39th IOS	39th Information Operations Squadron
711th HPW	711th Human Performance Wing
ACTA	Applied Cognitive Task Analysis
ADV IOIC	Advanced Information Operations Integration Course
AFCERT	Air Force Computer Emergency Response Team
AFDD	Air Force Doctrine Document
AFI	Air Force Instruction
AFRL	Air Force Research Laboratory
AFTTP	Air Force Tactics, Techniques & Procedures
AOC	Air Operations Center
BPR	Business Process Reengineering
CA	Civil Affairs
CI	Counterintelligence
CIA	Central Intelligence Agency
COA	Course of Action
COM	Component Object Model
CSE/SE	Cognitive Systems Engineering and Software Engineering
CTA	Cognitive Task Analysis
DII COE	Defense Information Infrastructure Common Operating Environment
EJB	Enterprise Java Beans
EW	Electronic Warfare
HA	Humanitarian Assistance
HTML	Hyper Text Markup Language
I&W	Indications and Warnings
IDEF0	Integrated Definition for Function Modeling
IFO	Influence Operations
IFOTA	Influence Operations Training Aid
INOSC	Integrated Network Operations and Security Center
INTRO IOIC	Introductory Information Operations Integration Course
IO	Information Operations
ION	Information Operations Navigator
IOPC-J	Information Operations Planning Capability - Joint
IOTA	Information Operations Training Aid
IOTT	Information Operations Team Training
IW	Information Warfare
IWAS	Information Warfare Aggressor Squadron
IWE	Information Warfare Effectiveness
IWF	Information Warfare Flight
IWPC	Information Warfare Planning Capability
IWS	InfoWorkspace
JAEP	Joint Air Estimate Process

JAOC	Joint Air Operations Center
JAOP	Joint Air Operations Plan
JCS	Joint Chiefs of Staff
JDBC	Java Data Base Connectivity
JFACC	Joint Force Air Component Commander
JMS	Java Messaging System
JP	Joint Publication
JTF	Joint Task Force
JWICS	Joint Worldwide Intelligence Communications System
LIMFACs	Limiting Factors
MAJCOM	Major Command
MD	Military Deception
MEC	Mission Essential Competency
MOE	Measure of Effectiveness
MOP	Measure of Performance
NEO	Non-Combatant Evacuation Operations
NIOC-MD	Navy Information Operations Command-Maryland
NIPRNET	Non-Secure Internet Protocol Router Network
NOD	Network Operations Division
NW	Net Warfare
OPSEC	Operations Security
OSGI	Open Systems Gateway Initiative
PA	Public Affairs
POL	Petroleum, Oil, & Lubricants
PSYOP	Psychological Operations
PSYOP PT	Psychological Operations Planning Tool
RCP	Rich Client Platform
RFI	Request for Information
RHA	Warfighter Readiness Research Division
RHC	Warfighter Interface Division
RMI	Remote Method Invocation
SIPRNET	Secret Internet Routing Protocol Network
SMART	Subject Matter Analysis & Research Toolkit
SMC	Signature Management Course
SME	Subject Matter Expert
TA	Target Audience
TBMCS	Theater Battle Management Core Systems
UML	Unified Modeling Language
USA	United States Army
USAF	United States Air Force
WAIT-C	Warfighter Analysis of Innovative Technologies and Concepts
WCD	Work-Centered Design